

# **Missouri Antidegradation Policy and Implementation Procedure**

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(new in red/ no strikethroughs shown)

**Note:** For purposes of discussion, bolded terms are defined in the *Glossary*.



Missouri  
Department of  
Natural Resources

**Water Protection Program  
Water Pollution Control Branch**

# Missouri Department of Natural Resources

## Antidegradation Policy and Implementation Procedure

### TABLE OF CONTENTS

I.	Missouri's Water Quality Antidegradation Policy.....	10
A.	Summary of Applicable Laws and Regulations on Antidegradation.....	10
B.	Assigning the Tier Protection Levels.....	11
1.	Assigning Tier 1 Review.....	13
2.	Assigning Tier 2 Review.....	14
3.	Assigning Tier 3 Review.....	14
C.	Revising Tier Review Levels.....	14
II.	Missouri's Antidegradation Implementation Procedure.....	15
A.	Determining the Significance and Appropriateness of Degradation.....	15
1.	Determining Existing Water Quality .....	19
a)	Summary of Approach.....	19
b)	Water Quality Assessment Procedures.....	20
c)	Pollutants of Concern.....	23
d)	Using Models or Data to Establish Existing Water Quality.....	24
2.	Relationship of Antidegradation to Beneficial Uses and Classifications.....	24
a)	Protecting Beneficial Uses of Classified Waters.....	24
b)	Protecting Fishable/Swimmable Uses on Unclassified Waters.....	25
3.	Determining Event-Specific and <b>Cumulative Degradation</b> .....	25
B.	Review for Alternatives to Degradation.....	28
1.	Identifying Less-Degrading and Non-Degrading Pollution Control Measures.....	28
2.	Evaluating Effectiveness and Reasonableness of Alternatives.....	30
3.	Determining Cost of Alternatives.....	31

## TABLE OF CONTENTS (continued)

4. Comparing the Costs of Alternatives.....	31
5. Selection of a Preferred Alternative.....	33
6. Expedited Review for Advanced Treatment Systems.....	34
C. Review for Conformance to Technology-Based Requirements.....	35
D. Review for Implementation of Nonpoint Source Controls.....	35
E. Determining Socio-Economic Importance (SEI) of the Proposed Discharge.....	36
1. Requirements for Determining Socio-Economic Importance.....	36
2. The Role of the Applicant.....	36
3. The Role of the Department.....	37
4. Preliminary Determination of Socio-Economic Importance.....	38
5. Public Participation in Determining the Socio-Economic Importance .....	38
F. Public and Interagency Participation in Antidegradation Reviews.....	38
1. Public Notification Requirements.....	39
2. Opportunities for Public Participation.....	40
3. Intergovernmental Coordination and Review.....	41
4. Appeals of Antidegradation Review Decisions.....	41
III. Permitting Considerations.....	41
A. General Storm Water Permits.....	43
B. Site-Specific Permits.....	43
C. §401 Certifications.....	44
IV. Monitoring and Assessment Considerations.....	45
A. Data Collection and Evaluation.....	45
B. Applicability to §305(b) Report and §303(d) List.....	45

## TABLE OF CONTENTS (continued)

V.	Applicability to Total Maximum Daily Loads.....	46
VI.	Administrative Record of Decisions.....	46

## GLOSSARY

Page 6

## LIST OF FIGURES

<b>Figure 1.</b>	Summary of Section II.A. Tier 2 Antidegradation Review .....	17
<b>Figure 2.</b>	Summary of Section II.A. Tier 1 Antidegradation Review.....	18
<b>Figure 3.</b>	Simplified representation of water body assimilative capacity for pollutant x...	26
<b>Figure 4.</b>	Diagram depicting key factors in calculating a Waste Load Allocation to a stream.....	28
<b>Figure 5.</b>	Comparison of treatment costs to produce effluents of varying quality.....	32

## LIST OF APPENDICES

<b>APPENDIX 1 - Examples of Calculations for Minimal Degradation.....</b>	<b>48</b>
<b>Example 1. Example calculation for determining minimal degradation from a new discharge.....</b>	<b>49</b>
<b>Example 2. Example calculation for determining minimal degradation from a expanding discharge.....</b>	<b>50</b>
<b>Example 3. Example calculation for determining minimal degradation from a new discharge replacing an existing discharge.....</b>	<b>51</b>
<b>Example 4. Example calculation for determining minimal degradation from a new discharge replacing two existing discharges.....</b>	<b>52</b>
<b>Example 5. Example calculation for determining minimal degradation from an expanded discharge replacing an existing discharge.....</b>	<b>53</b>
<b>Example 6. Example calculation for determining minimal degradation from multiple new discharges.....</b>	<b>55</b>

<b>APPENDIX 2 - Example Modeling Approach for Determining Existing Water Quality.....</b>	<b>58</b>
<b>APPENDIX 3 - Worksheets.....</b>	<b>59</b>
<b>Worksheet 1.</b> General Worksheet on Antidegradation Reviews.....	60
<b>Worksheet 2.</b> Worksheet for Evaluating Alternatives to Discharges.....	64
<b>Worksheet 3.</b> Worksheet for Evaluating Implementation of State Level Controls on Point Sources and Effective Best Management Practices (BMPs) on Nonpoint Sources.....	70
<b>Worksheet 4.</b> Worksheet for Using the Pollutant-by-Pollutant Approach for Determining Significance of Degradation.....	72
<b>Worksheet 5a.</b> Worksheet for Documenting Socio-Economic Baseline Information and Treatment Costs.....	73
<b>Worksheet 5b.</b> Worksheet for Documenting Socio-Economic Affects of the Proposed Treatment.....	75
<b>Worksheet 5c.</b> Test for Socio-Economic Importance and Impacts.....	77

## GLOSSARY

**NOTE:** This document occasionally refers to itself as "this document." Such use of terms is meant to make reference to the entire document entitled, *Missouri Antidegradation Implementation Policy and Procedure*.

Unless otherwise noted below, the terms used in this document are synonymous with the definitions found in section (§) 644.016 of the Revised Statutes of the State of Missouri (RSMo) and 10 Code of State Regulations (CSR) 20-2.

**7Q10:** See "Seven (7) Q10 Stream Flow"

**Administrative Record of Decisions:** The record of all information considered and decisions made during antidegradation reviews. The purpose this record is to create a historical reference to the basis for decisions and a complete explanation of the conclusions reached.

**Alternatives Analysis:** An evaluation of possible cost-effective, reasonable alternatives to regulated discharges that might degrade water quality, including less-degrading alternatives, non-degrading alternatives, and no-discharge alternatives, such as treatment process changes, relocated discharge facilities, land application, reuse, and subsurface discharges. The evaluation must provide substantive information pertaining to the cost and environmental impacts associated with the proposed discharge and the alternatives being evaluated, so that the most cost-effective, most reasonable, and least degrading approach for addressing impacts from the proposed discharge can be identified.

**Antidegradation:** The implementation of a regulatory policy and procedure approved by the United States Environmental Protection Agency (EPA) and the Missouri Clean Water Commission that specifies how the (the department) will determine, on a case-by-case basis, whether and to what extent, existing water quality may be degraded in a water of the state.

**Available Assimilative Capacity:** The difference between **existing water quality** and the water quality criterion for any pollutant.

**Beneficial Uses or Beneficial Water Uses:** All existing and designated uses on or in waters of the state as defined in the Water Quality Standards (WQS) at 10 CSR 20-7.031(1)(C).

**Clean Water Act (CWA):** The federal Water Pollution Control Act, 33 U.S.C. §§1251 et seq.

**Clean Water Commission or Missouri Clean Water Commission (MCWC):** The water contaminate control agency formed under §644.021 RSMo.

**Critical Flow Conditions:** The point in time in which the **beneficial uses** within a water of the state are most susceptible to the effects of pollution, which is generally but not necessarily when a stream is at or below its Seven Day Q10 (7Q10) flow. A lake's critical condition shall be determined on a case-by-case basis but would normally be when the surface water is at or below its ordinary or base level.

**Cumulative Degradation:** The reduction of more than 20% of a water's assimilative capacity following the establishment of the water's Existing Water Quality.

**Degradation:** A decline in the chemical, physical, or biological conditions of a surface water or other decline in water quality as measured on a **pollutant-by-pollutant basis**.

**Department:** Missouri Department of Natural Resources

**Designated Use:** A **beneficial use** designated to a water of the state as shown in Tables G and H of the **Water Quality Standards (WQS)**.

**Existing Use:** A use of a surface water that has actually occurred in a water of the state on or after November 28, 1975, and is currently attainable on or in the water, whether or not the uses are included as **designated uses** in the Water Quality Standards.

**Existing Water Quality (EWQ):** A characterization of current (existing) level of **pollutants of concern** in a water. The EWQ shall be representative of the water quality immediately upstream from the point a discharge enters the water and at the time the discharge is subject to an antidegradation review in accordance with the procedures in this document. Once established, EWQ is a fixed quantity/quality expressed as a waste load allocation. *For waters receiving pollutants from permitted facilities that are in compliance with the terms and conditions of their permits, the EWQ shall include the levels of pollutants already permitted to be discharged to the waters at the time EWQ is first determined.*

**Less-Degrading Alternative, or Less-Degrading Pollution Control Alternative:** A cost-effective, reasonable discharging alternative (i.e., measure) identified through an **alternative analysis**.

**Minimal Degradation or Minimally Degrade:** The reduction of the **available assimilative capacity** for any pollutant by 10 percent or less as a result of any single discharge or by less than 20 percent for all discharges combined after Existing Water Quality was determined. Events or activities causing minimal degradation are not required to undergo a Tier 2 antidegradation review.

**National Pollutant Discharge Elimination System:** The point source discharge permit program established by §402 of the federal Water Pollution Control Act (Clean Water Act) [33 U.S.C. Section 1342].

**Non-Degrading Alternative, or Non-Degrading Pollution Control Alternative:** A cost-effective, reasonable alternative to a proposed discharge that would not result in **degradation** of water quality as characterized by the **Existing Water Quality (EWQ)** assessment.

**Outstanding National Resource Water (ONRW):** Waters listed in Table D of the Water Quality Standards.

**Outstanding State Resource Water (OSRW):** Waters listed in Table E of the Water Quality Standards.

**Pollutant:** Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewer sludge, munitions, chemical waste, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, filter backwash or industrial, municipal or agricultural waste discharged into water.

**Pollutant-by-Pollutant Basis:** The review of the pollutants in a water body by assessing the level of each pollutant (or **pollutant of concern**) as opposed to assessing the overall condition of a water body for the purpose of determining the level of review applicable to the water. (See **Water body-by-Water body Approach**)

**Pollutant of Concern (POC):** Discharged pollutants, or pollutants proposed for discharge, for which a State water quality standard has been written and that pose a reasonable potential for degrading water quality within **waters of the state**.

**Preferred Alternative:** The alternative identified by an antidegradation review that represents the best balance between the significance of degradation and the socio-economic importance of the discharging activity.

**Regulated discharge:** Any discharge that requires a permit or a water quality certification from the department pursuant to a state or federal law.

**Segment:** This document often refers to the waters receiving discharges as "segments." The use of this term is intended to identify the portion of a water body the discharge is expected to affect (degrade). An evaluation of the **Existing Water Quality (EWQ)** must be made for the entire affected segment. Because the EWQ will vary along the entire segment, the applicant may use modeling to describe the variation in degradation for each segment spatially and/or during specific periods or seasons.

**Seven (7) Q10 Stream Flow or 7Q10:** The lowest average flow that occurs for seven (7) consecutive days once every ten (10) years.

**Significant Degradation:** A reduction by more than 10 percent of the **available assimilative capacity** for any pollutant as a result of any single discharge, or by more than 20 percent for all discharges combined (See **cumulative degradation**) after **Existing Water Quality (EWQ)** was determined. Events or activities causing significant degradation are required to undergo a Tier 2 antidegradation review.

**Temporary Degradation:** Degradation that is not expected to cause a lasting effect on water quality. Degradation is generally considered temporary if it lasts six months or less (i.e., water quality returns to **Existing Water Quality (EWQ)** within six months after the discharge commences and results from non-toxic pollutants (e.g., sediments or nonvolatile suspended solids). Temporary degradation will be determined on a case-by-case basis by the department after reviewing the duration, effect and frequency of the discharge(s). A typical cause for temporary degradation may be a discharge of sediments in storm water from construction sites.

**Tier 1 Review:** Policies and procedures that apply to waters that qualify for Tier 1 protection in accordance with this document. Tier 1 protection requires a Tier 1 review designed to prohibit degradation which results in the loss of an existing use, or violation of water quality criteria; and prohibit further degradation of existing water quality where pollutants of concern have resulted in the water being included on the 303(d) list. Tier 1 review applies as the minimum review level to all surface waters regardless of existing water quality and applies on a **pollutant-by-pollutant basis**.



**Tier 2 Review:** Policies and procedures that apply to waters that qualify for Tier 2 protection in accordance with this document. Tier 2 protection requires a Tier 2 review designed to prohibit degrading the quality of a surface water unless a review of reasonable alternatives and social and economic considerations justifies the degradation of water quality. Tier 2 review applies to all waters where existing water quality is better than applicable Water Quality Standards as determined on a **pollutant-by-pollutant basis**.

**Tier 3 Review:** Policies and procedures that apply to waters given Tier 3 protection. Tier 3 protection requires a Tier 3 review designed to prohibit any degradation of water quality in Outstanding National Resource Waters (ONRWs) and Outstanding State Resource Waters (OSRWs) waters as identified in Tables D and E of the Water Quality Standards. **Temporary degradation** of a water under Tier 3 review may be allowed on a case-by-case basis by the department as explained in section II.A.4 of this document. Tier 3 reviews apply on a waterbody-by-waterbody basis.

**Toxic:** A pollutant (or synergetic pollutants) which, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism, either directly from the environment or indirectly by ingestion through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in the organism or its offspring.

**Water Body-by-Water Body Approach:** The review of the pollutants in a water body by assessing the overall or combined levels of pollutants (or **pollutants of concern**) as opposed to assessing the level of each pollutant of a water body for the purpose of determining the level of review applicable to the water. (See **Pollutant-by-Pollutant Approach**)

**Waters of the State:** Waters as defined in §644.016(25) RSMo. The term "water" is often used in this document in place of this phrase.

**Water Quality Criteria:** Elements of Water Quality Standards that are expressed as pollutant concentrations, levels, or narrative statements representing a water quality that supports a designated use, i.e., 10 CSR 20-7.031(3) and (4).

**Water Quality Standards (WQS):** The provisions of 10 CSR 20-7.031 covering water classification, general and specific water quality criteria, antidegradation and all other requirements establishing limits on the amount of pollution permissible in waters of the state.

## ANTIDegradation Policy & Implementation Procedure

### I. Missouri's Water Quality Antidegradation Policy

The following are the implementation procedures for Missouri's antidegradation rule found at Title 10 Code of State Regulations, Division 20, Chapter 7.031(2) (i.e., 10 CSR 20-7.031(2)) and federal antidegradation policy at 40 Code of Federal Regulations (CFR) Section (§)131.12. The Department of Natural Resources (the department) is required by 40 CFR §131.12(a) to develop and adopt a statewide antidegradation policy and to identify procedures for implementing that policy. Implementation generally includes

- identifying the antidegradation review levels (i.e., the “tiers”) that apply to a surface water;
- determining **Existing Water Quality (EWQ)**;
- assessing and determining appropriate extent of water quality degradation;
- identifying and assessing less-degrading or non-degrading alternatives;
- determining the importance of economic or social development to justify degradation of waters; and
- establishing intergovernmental coordination and public participation processes.

#### A. Summary of Applicable Laws and Regulations on Antidegradation

The Missouri Clean Water Law (§§644.006 - 644.150 RSMo) establishes requirements for the protection and management of surface water and groundwater quality. The Missouri Clean Water Commission (MCWC) through the assistance of the department promulgates regulations on water quality. Missouri's **Water Quality Standards (WQS)**<sup>1</sup> are written into regulation at 10 CSR 20-7.031. The specific portion of the regulation prescribing the policy on antidegradation is 10 CSR 20-7.031(2).

The antidegradation policy is one of four required regulatory elements of the WQS. The other three elements include water classification, beneficial uses, and water quality criteria (narrative and numeric). All of these review elements must be administered as a whole.

Waters identified within Tables G and H of the WQS are regarded as “classified.” All other waters of the state are “unclassified.” All waters of the state are subject to Missouri's *Antidegradation Policy and Implementation Procedure* (this document).

The beneficial uses<sup>2</sup> and the applicable water quality criteria can be found in 10 CSR 20-7.031. All waters of the state are subject to general criteria contained in 10 CSR 20-7.031(3). All waters listed in Tables G and H have beneficial uses and are subject to the specific (numeric) water quality criteria contained in 10 CSR 20-7.031(4).

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<sup>1</sup> For purposes of this document, the terms “criteria” and “standards” have separate meanings (see Glossary). This document uses the phrase “**water quality standards or WQS**” when referring to the collective provisions of 10 CSR 20-7.031. The phrase “**water quality criteria**” strictly refers to the provisions of 10 CSR 20-7.031(3) and (4) (i.e., the narrative and numeric limits placed on specific pollutants based on designated use).

<sup>2</sup> “Beneficial uses” is a general term used to mean both “existing” and “designated” uses. See Glossary.

**Beneficial uses** may vary in a water and may change at various locations. Most waters have more than one beneficial use. Where more than one use exists (see definition of **Existing Use**), or has been designated (see definition of **Designated Use**) for a water, the use with the most stringent water quality requirements must be maintained and protected. An antidegradation review shall be performed for the entire **segment** (or multiple segments) of water expected to be **significantly degraded** by a new or expanded discharge. Depending on the pollutant load within the discharge and distance to, and assimilative capacity of, waters downgradient of the discharge point, the review may extend into more than one classified **segment**. The review must extend downgradient as far as **significant degradation** is expected regardless of the classification status of the receiving waters. If the expected degradation is confined within a single segment, the review may be limited to only the portion of the segment to be affected.

Waters listed in Tables D and E of the **WQS** are waters of outstanding quality. These waters include the state's Outstanding National Resource Waters (ONRW) and the Outstanding State Resource Waters (OSRW). The degradation of water quality of these surface waters is prohibited except from short-term effects of **temporary degradation**.

All waters of the state are protected under at least one of three tiers of the antidegradation policy. Section I.B of this document describes these tiers and explains how the protection levels are assigned to each water. Section I.C explains how the tier protection level may be revised.

B. Assigning Tier Protection Levels

The following three levels (or “tiers”) protect water quality from degradation in all **waters of the state** on a **pollutant-by-pollutant basis**. The tiers are specified in rule at 10 CSR 20-7.031(2):

(2) Antidegradation. The antidegradation policy shall provide three (3) levels of protection.

(A) Tier One. Public health, existing instream water uses and a level of water quality necessary to protect existing uses shall be maintained and protected.

(B) Tier Two. For all waters of the state, if existing water quality is better than applicable water quality criteria established in these rules, that existing quality shall be fully maintained and protected. Water quality may be lowered only if the state finds, after full satisfaction of the intergovernmental coordination and public participation requirements, that the lowered water quality is necessary to allow important economic and social development in the geographical area in which the waters are located. In allowing the lowering of water quality, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control before allowing any lowering of water quality. This provision allows a proposed new or modified point or nonpoint source of pollution to result in limited lowering of water quality provided that –

1. The source does not violate any of the general criteria set forth in section (3) of this rule [not shown here], or any of the criteria for protection of beneficial uses set forth in section (4) of this rule [not shown here];

2. The source meets all applicable technological effluent limitations and minimum standards of design for point sources or minimum pollution control practices for nonpoint sources; and

3. The lowering of water quality, in the judgment of the department, is necessary for the accommodation of important economic and social development in the geographical vicinity of the discharge. In making a preliminary determination based on socioeconomic development considerations, the department may consider the potential for regional increases in utility rates, taxation levels or recoverable costs associated with the production of goods or services that may result from the imposition of a strict no-degradation policy. Consideration may also be given to the possible indirect effects of a policy on per capita income and the level of employment in the geographical vicinity of the proposed pollution source. Any preliminary decision by the department to allow a limited lowering of water quality will be stated as such in a public notice issued pursuant to 10 CSR 20-6.010. Pursuant to that provision, a public hearing will be held in the geographical vicinity of the proposed pollution source, if the department determines there is significant public interest in and need for a hearing.

(C) Tier Three. There shall be no lowering of water quality in outstanding national resource waters or outstanding state resource waters, as designated in Tables D and E [of the **Water Quality Standards**].

The protections created by those sections of the rule, in combination with the policies and procedures outlined in this document, can be comprehensively summarized as follows:

**Tier 1 Protection:**

Policies and procedures that prohibit degradation that would result in the loss of an existing use or violation of water quality criteria; and prohibits further degradation of existing water quality where additional **pollutants of concern** would result in the water being included on the 303(d) list. Tier 1 protection applies as the minimum protection level to all surface waters regardless of the **Existing Water Quality (EWQ)**.

**Tier 2 Protection:**

Policies and procedures that prohibit the degradation of water quality of a surface water unless a review of reasonable alternatives and social and economic considerations justifies the degradation. Tier 2 protection applies on a **pollutant-by-pollutant basis** to all waters where **EWQ** is significantly better than the applicable **WQS**. To be "significantly better" than **WQS**, the criteria for a **Pollutant of Concern (POC)** must be outside of the 90 percent statistical confidence interval of the available data.

**Tier 3 Protection:**

Policies and procedures that prohibit any degradation of water quality in ONRWs and OSRWs waters as identified in Tables D and E of the **WQS**. **Temporary degradation** of water receiving Tier 3 protection may be allowed by the department on a case-by-case basis as explained in section II.A. of this document.

The level of protection identified above determines the type of antidegradation review required when new or expanded discharges are proposed. Tier 1 protection requires a Tier 1 review, Tier 2 protection requires a Tier 2 review and Tier 3 protection requires a Tier 3 review. Because the Tier 1 and 2 reviews are conducted on a **pollutant-by-pollutant basis**, this document refers to these reviews as a review of a "pollutant" as opposed to the overall quality of a "water body." (Further explanation can be found in the **Glossary**.)

Tier 1 reviews allow pollutants to be discharged in accordance with **WQS** without the antidegradation review required in section II.A of this document. All other requirements for the development of appropriate permit limits apply (such as application of appropriate federal effluent limitation guidelines (ELGs) for certain industries and secondary treatment standards for domestic wastewater). For pollutants receiving a Tier 1 review, the target water quality is determined by the **WQS** in combination with these other permitting requirements.

Because Tier 1 and 2 reviews are conducted on a **pollutant-by-pollutant basis** as opposed to a **water body-by-water body** approach, the allowance for degradation of water quality through a discharge of a pollutant depends on the existing level of that pollutant within the receiving water, i.e., the **EWQ**, and the probability of promptly restoring the quality where pollutants levels are elevated. Waters already containing high levels of certain pollutants that qualify for Tier 1 protection may receive the same pollutants without a section II.A (Tier 2) antidegradation review if the discharge: 1) would not violate **WQS**; 2) all other conditions of the state permitting requirements are met (i.e., no-discharge options are explored and technology-based requirements (including ELGs) are met); and 3) permit is issued reflecting the highest statutory and regulatory requirements. Section II.A of this document lists other examples of discharges not requiring a Tier 2 antidegradation review based on the minimal degradation that results during those discharges.

In the absence of information on **EWQ**, waters shall automatically receive Tier 2 review prior to receiving any additional **pollutants of concern** that might result in degrading the **EWQ**.

This procedure requires all waters to receive a Tier 2 review where a discharge will **significantly degrade** water quality. An exception is made for **ONRWs** and **OSRWs** that shall always be given Tier 3 protection (no degradation of water quality).

#### 1. Assigning Tier 1 Review

Tier 1 review is assigned on a **pollutant-by-pollutant basis** by the department after consideration of pollution affecting the waters' ability to attain **WQS** or the waters' beneficial uses.

Tier 1 review shall not result in the loss of an existing use, or in the violation of water quality criteria. However, pollutants already in violation of the **WQS** may be given Tier 1 review to determine if it is appropriate to allow a discharge that meets **WQS** at the end-of-pipe. *Only those pollutants that are documented as already*

*being at, near or below WQS qualify for a Tier 1 review.* The discharge of all other pollutants will require a Tier 2 review.

## 2. Assigning Tier 2 Review

A Tier 2 review shall be conducted by default on all waters of the state **before an application for a permit to discharge is filed, unless one of the following conditions apply:**

- **the water is an Outstanding State or National Resource Water to which Tier 3 protection applies,**
- **the discharge is considered insignificant in accordance with the criteria explained in section II.A of this document,**
- **the pollutant of concern is not already at a level that qualifies the water for Tier 1 protection.**

## 3. Assigning Tier 3 Review

This review shall automatically apply to ONRWs and OSRWs listed in Tables D and E in the rules at 10 CSR 20-7.031. All ONRWs and OSRWs are presumed to have no significant levels of pollutants under normal circumstances. Any degradation of water quality is prohibited in these waters unless the degradation only results in **temporary degradation**, as determined on a case-by-case basis in accordance with section II.A of this document.

## C. Revising Tier Review Levels

The default tier review will change from Tier 3 to Tier 2 if the water is no longer designated in rule as an ONRW or OSRW. The department may also change a review level from Tier 2 to Tier 1 if a pollutant reaches the levels explained in section I.B.1 of this document. The change in a review level of any pollutant will require an opportunity for public review as outlined in section II.F of this document.

Any person may petition the MCWC to designate a water as an OSRW, and thus requiring Tier 3 review, if the water is documented to have the following conditions in accordance with 10 CSR 20-7.031(8):

- a high level of aesthetic or scientific value;
- undeveloped watershed; and
- located on or passes through lands which are state or federally owned, or which are leased or held in perpetual easement for conservation purposes by a state, federal or private conservation agency or organization.

Unique waters such as those that are highly aesthetic; provide critical needs for threatened, rare or endangered species; have archeological, cultural, scientific or exceptional recreational importance; or provide a special educational opportunity, should be given protection through the designation of a special use under 10 CSR 20-7.031(1)(C)14. When these special use designations are assigned, the department should recommend appropriate site-specific criteria to protect the unique quality of

these waters. The tier review level assigned to these unique waters will follow the same procedures developed for all other waters.

## II. Missouri's Antidegradation Implementation Procedure

This portion of the document outlines the procedure for determining whether or not to allow degradation in waters of the state from regulated discharges. The antidegradation review procedure is based on

- the level of protection (i.e., Tier 1, 2 or 3) assigned to the pollutants of concern within the water receiving the discharge,
- the type of receiving water,
- **EWQ** in the receiving water,
- the projected impacts, and
- the nature of the proposed discharge.

Regulated discharges that have the potential to degrade water quality are subject to antidegradation review requirements. The exception is when the pollutants being discharged are already exceeding WQS, or are at or near WQS, and the existing water quality cannot be restored within a single permit term (i.e., five years). Discharges subject to antidegradation review include point source discharges regulated under Missouri's permit program (e.g., Missouri State Operating Permits) and discharges regulated under federal permits or licenses that are subject to state water quality certification under §401 of the federal Water Pollution Control Act (a.k.a. **Clean Water Act** or CWA).

Antidegradation reviews are necessary when proposed new or expanded discharges will degrade water quality. In addition to reviewing the social and economic importance of discharges, the department and applicants must assure that proposed discharges fully protect **beneficial uses**, achieve the highest statutory and regulatory requirements. The department must also assure that activities within the watershed are implementing cost-effective, reasonable best management practices to control nonpoint source pollution. Determinations issued under these provisions must be made in accordance with the public notification process described in section II.F.1 of this document. Diagrams of the steps required for an antidegradation review are presented in Figures 1 and 2 of this document.

### A. Determining the Significance and Appropriateness of Degradation

The department shall make a determination of whether the proposed new or expanded discharge will result in a significant degradation of water quality with respect to water quality criteria. The activity shall be considered not to result in significant degradation, if:

- The effluent increases the available assimilative capacity for a pollutant. For example, a discharge may not require a Tier 2 review if involves increased flow with less concentration of pollutants. When the pollutants have the potential to accumulate within a waterbody either in sediments or in fish tissue, the applicant may be required to assess the potential for such an

accumulation of these pollutants in determining the significance of degradation.

- The activity will result in only **temporary degradation** of water quality;
- An existing facility is applying for renewal with no new or expanded discharge;
- The new or expanded discharge would not result in a reduction of the **available assimilative capacity** (the difference between the **EWQ** and the applicable **WQS**) of 10 percent or more at the defined **critical flow condition(s)** for the **pollutant(s) of concern** and would not result in degradation of 20 percent or more when considering all of the new or expanded discharges since the EWQ was first determined;
- Combined and sanitary sewer overflows (CSOs and SSOs) control projects resulting in a net decrease in the overall pollutant loadings to surface waters shall be excluded from review requirements. Treatment byproducts of CSO and SSO discharges should also be excluded from review requirements; or
- The new or expanded discharges of pollutants that do not have a state numeric criterion (such as sediments and nutrients) for which an available assimilative capacity can not be determined shall be reviewed using the best available scientific approach to determine the potential significance of degradation. For example, nutrients may be reviewed in terms of their potential to decrease water clarity. An expected decrease in clarity of less than 10 percent of the pre-discharge clarity may be considered insignificant. Clarity may, as an example, be measured by Secchi disk depth or by chlorophyll a concentration. Methods for determining expected degradation from pollutants for which a numeric criterion has not been written should be approved by the department before an assessment is made.

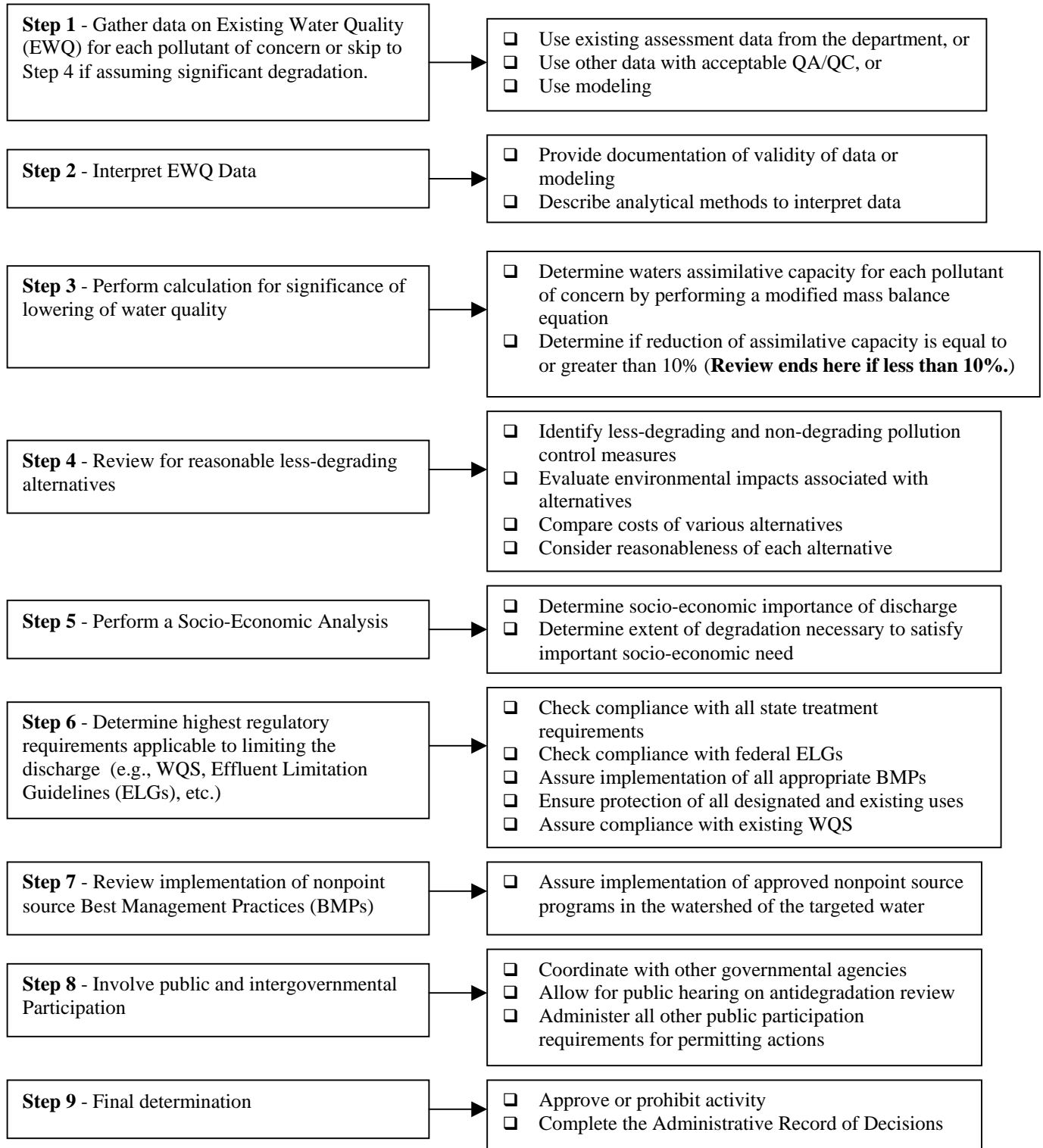
It should be noted that **pollutants of concern** for section II.A antidegradation reviews include those pollutants reasonably expected to be present in the discharge. Calculations of the remaining assimilative capacity will be conducted all identified **pollutants of concern (POCs)** unless the discharger wishes to assume that all or some of the POCs will result in significant degradation.

If a determination is made that **significant degradation** will occur, or it is assumed, the department will determine from information provided by the discharger whether or not the degradation is necessary. From the information provided by the discharger, the department shall determine the necessity of degradation in accordance with section II.B of this document. The determination will be made by confirming that reasonable and cost-effective, less-degrading or non-degrading alternatives to the proposed discharge do not exist and that the discharge is necessary to accommodate important socio-economic conditions within the community affected by the discharge.



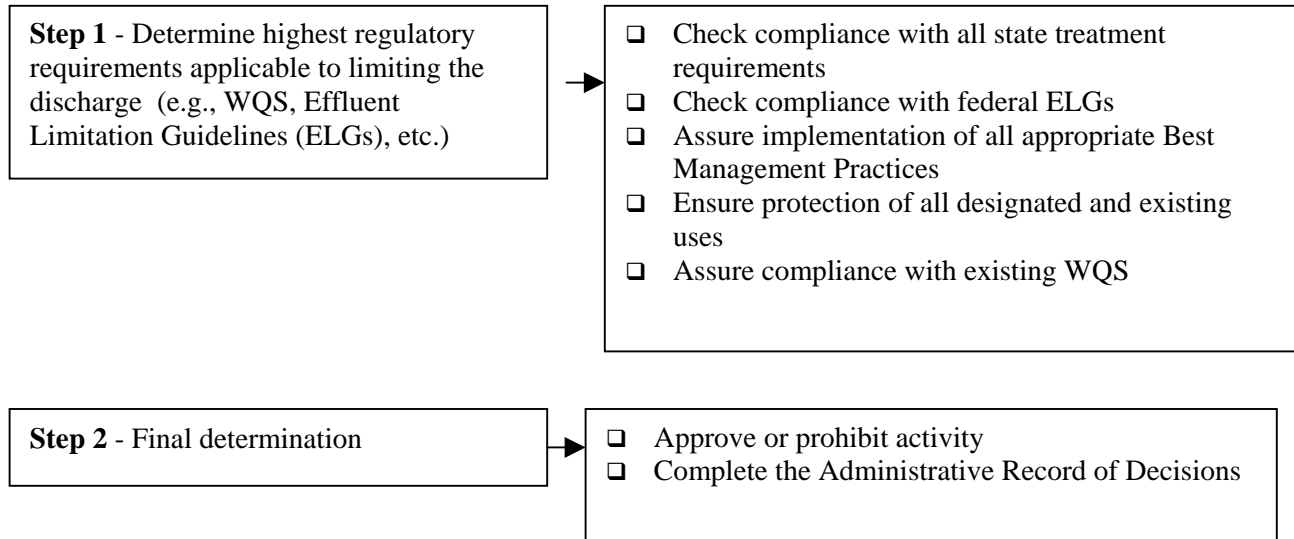
**Figure 1.** Summary of Section II.A. Antidegradation Review for Tier 2 Waters.

This review must be conducted if a proposed discharge creates a reasonable potential for significantly degrading the quality of a water of the state.



**Figure 2.** Summary of Section II.A. Antidegradation Review for Tier 1 Waters.

This review must be conducted if a discharge of Pollutants of Concern are proposed to a water where these pollutants are already at, near, or exceed the Water Quality Standards (WQS).



## 1. Determining Existing Water Quality

NOTE: Determining **EWQ** may be avoided if the discharger chooses to proceed on the assumption that all **POCs** will cause **significant degradation** to at or near the **WQS**. Dischargers wishing to make this assumption may skip to an **Alternatives Analysis** discussed in section II.B of this document. Forgoing the **EWQ** determination does not relieve the discharger from all of the other antidegradation review requirements including evaluating all feasible and cost-effective non-discharging or less-discharging alternatives in section II.B or from the socio-economic analysis in section II.E.

### a) Summary of Approach

Existing water quality or **EWQ**, provides the yardstick by which **available assimilative capacity** is measured for waters. The **WQS**, not **EWQ**, establish the target for waters receiving Tier 1 review; however, no degradation of existing water quality is permitted for any pollutant already causing water quality to not meet the applicable **WQS**. *Consequently, **EWQ** reviews are only necessary for waters where a discharge creates a reasonable potential for degrading water quality for existing pollutants that have not already reached or exceeded **WQS**. Also, for waters receiving pollutants from permitted facilities that are in compliance with the terms and conditions of their permits, the **EWQ** shall include the levels of pollutants already discharged to the waters at the time **EWQ** is first determined.*

This section describes how **EWQ** is characterized through:

- Establishment of **EWQ** for waters using existing water quality assessment data where it exists.
- Approaches which consider the size and potential impacts of the proposed discharge when determining data needs for **EWQ** characterization and antidegradation review.
- Cooperative action by both the department and the applicant to generate **EWQ** information where little or no data exists.

In general, **EWQ** for waters will be based upon existing assessments conducted under the current department monitoring and assessment programs. **EWQ** assessments will seek to gather information on **POCs** reasonably expected to be in discharges regulated by state, federal, or local agencies.

The preferred approach for assessing **EWQ** is to use existing water quality data where available. Where adequate data are not available, the second preferred approach is to collect water quality data. The third preferred approach for assessing **EWQ** is to use an appropriate water quality model. Sometimes more than one approach may be needed to characterize **EWQ** for all **POCs**.

To help the department determine **EWQ**, existing uses, and the applicable tier review level for each pollutant, the regulated entity generally will be required to provide **EWQ** data for **POCs** that are reasonably expected to be discharged. The regulated entity is advised to contact the department prior to initiating a **EWQ** evaluation to seek guidance and concurrence regarding the pollutants to be assessed and the proposed sampling protocols.

Where little or no data exists, the department can advise the applicant on what approaches may be used to establish **EWQ**. If a data collection effort is chosen, the department can advise the applicant on what data is needed and can provide guidance on how to collect and report the needed information to the department. Modeling approaches to determining **EWQ** are discussed in section II.A.1.d and Appendix 2 of this document.

b) Water Quality Assessment Procedures

**EWQ** must be established in order to conduct an antidegradation review for regulated discharges that may degrade waters. Specifically, **EWQ** must be established if no **EWQ** characterization is already available or if no information is available on the **POCs** to be discharged into the water. To establish **EWQ**, the department may consider data from a federal or state agency, the regulated entity, the public, or any other source as long as the data: 1) were collected in accordance with an approved quality assurance project plan; and 2) were collected using specified assessment or sample collection and analysis protocols. If adequate data are not available, the department may require the applicant to generate the necessary **EWQ** data or present a model prior to reviewing a permit application.

The establishment of **EWQ** may be accomplished in many different ways and may require significantly different approaches depending on the physical and chemical characteristics of the water and the conditions affecting its quality. Therefore, plans for gathering **EWQ** data should be closely coordinated with the department to ensure an agreement on the plan's methods and scope.

When data collection is involved, it is recommended that regulated entities submit their monitoring and quality assurance/quality control (QA/QC) plans well in advance (i.e., at least six months) of any planned activities or permit application submittals. This will facilitate and streamline the permitting process. Environmental groups, trade organizations, the general public, the department and other governmental agencies may also elect to generate **EWQ** data with the prior approval of the department and under appropriate, documented QA/QC procedures. Multiple dischargers to a surface water may combine resources to generate **EWQ** data and may join with other watershed stakeholders in the effort. The technical complexity associated with this process precludes establishment of universally applicable procedures. However, the objective of this effort – generating a reasonable, credible, and scientifically defensible characterization of existing water quality – provides a

framework for conducting such activities when needed to conduct antidegradation reviews.

Given the complexity of the issue, potential generators of **EWQ** data are expected to notify the department of their intent to generate data and to obtain agency concurrence on proposed sampling protocols, sampling locations, **POCs**, reporting format, etc., prior to initiating data collection efforts. The initial consultation with the agency may also be used by regulated entities to evaluate the availability of existing data that may be used as a supplement to, or in lieu of, new **EWQ** data.

When regulated entities or third parties collect data, the department may conduct field or laboratory audits to verify that data generators are adhering to established sampling protocols, and may split samples for independent analysis. Data generators that proceed without the department notification and concurrence, risk rejection of the data and significant delays in the permitting process. Potential generators of **EWQ** data are also encouraged to notify other regulated entities and stakeholders in the **segment** of their intent to generate **EWQ** data. Stakeholder cooperation in the **EWQ** assessment process may allow sharing of the cost of data generation and avoidance of conflict in subsequent permitting actions.

*Once **EWQ** is established for a surface water, it is the yardstick against which degradation is measured during all future antidegradation reviews on the **segment**.* If future monitoring data indicate that **EWQ** is improving due to upstream water pollution controls or water quality is changing due to natural conditions, the department may revise **EWQ** to reflect those water quality changes. Antidegradation policy generally does not allow a revision of the original **EWQ** measurement, that is, *EWQ is not a moving target, unless it moves in the direction that reflects improving water quality.* However, if it is shown that there was an error in determining **EWQ**, then **EWQ** should be reevaluated.

For proposals that entail a discharge into a water for which there is no existing water quality data (i.e., where new data must be collected or a model performed for assessment of **EWQ**), the location of the **EWQ** assessment generally will be immediately upstream of the proposed discharge location. For lakes, **EWQ** will be assessed near tributary inlet mixing areas, in the main body of the lake, or in other areas of the lake as appropriate. Determinations regarding **EWQ** characterization and accommodation of variations caused by seasonal impacts, water level fluctuations, or other factors will be made by the department.

Where there is adequate, existing water quality data from multiple sampling sites on a water, these stations can become the **EWQ** stations from which a composite **EWQ** characterization can be developed. Alternatively, the department may choose one existing monitoring site as the **EWQ** station from which to characterize **EWQ**. The department may request additional

monitoring at the site if the existing data are insufficient (e.g., where no information has been collected on pollutants of concern that would reasonably be expected in the proposed discharge).

It is important to note that when **EWQ** pollutant concentrations are presented as one numeric value applicable year-around, that it be representative of the concentration present during the **critical flow period**. Multiple values applicable to seasons, or other defined periods, may be used if supported by the data or modeling approach. Where uncertainty in the **EWQ** analysis is greater, either a factor of safety may be incorporated into the calculation or applicants may be required to collect EWQ data after the permit is issued to develop a EWQ profile during build-out of the activity's discharge capacity to verify the model results.

The department will consider the use of older data on a case-by-case basis as deemed appropriate, if such data are representative of **EWQ** conditions. In cases where significant changes have occurred in the watershed in the last five years, it may be appropriate to use a shorter period of record. *The elements of an acceptable **EWQ** monitoring plan depends on the complexities present in the specific situation.* Data collectors are expected to provide the results of all monitoring. Only the department approved monitoring results will be used in the establishment of **EWQ**. Sampling of lakes may differ, depending on the related hydrology, depth, length, location, and other factors. In all cases, applicants are advised to seek input from the department prior to developing an EWQ sampling plan and/or collecting samples.

All stream samples should be taken when there is a measurable surface flow in the **segment** at the **EWQ** sampling location. The **EWQ** may be measured for a specific period of time that corresponds to a discharge. **The water must be receiving discharge at the time it is sampled.** When such specific periods are analyzed, the resulting **EWQ** determination must clearly define the period during which the EWQ is representative, e.g., at a specific flow rate (cubic feet per second, or "cfs") or flow level (e.g., 8.1 feet at a specific gauge).

Before initiating **EWQ** sampling, a sampling plan should be developed and submitted. The sampling plan should address the following elements:

- Experimental design of the sampling project;
- Project goals and objectives;
- Evaluation criteria for data results;
- Background of the sampling project;
- Identification of target conditions (including a discussion of whether any weather, seasonal variations, stream flow, lake level, or site access may affect the project);
- Data quality objectives;
- Types of samples scheduled for collection;
- Sampling frequency;
- Sampling period;

- Sampling locations and rationale for site selection; and
- A list of field equipment (including tolerance range and any other specifications related to accuracy and precision).

Analytical methods for samples collected must comply with these parameters:

- A person conducting an analysis of a sample taken to determine compliance with a **WQS** shall use an United States Environmental Protection Agency (EPA)-approved analytical method, or an alternative analytical method that is approved by the department.
- Samples, containers, preservation techniques, holding times, and analysis shall be conducted in accordance with Guidelines Establishing Test Procedures and Analysis of Pollutants in 40 CFR Part 136. The use of other validated analytical methodologies may be authorized here if such use can be technically justified. Stream flow shall be measured each time **EWQ** sampling is performed.
- Acceptable methods for flow measurement include those described in the U.S Geological Survey manual, *Techniques of Water Resources Investigations of the United States Geologic Survey* (Chapter A8, Book 3, “Discharge Measurements at Gauging Stations”) and the department’s Environmental Services Program’s Standard Operating Procedure MDNR-WQMS-113, Flow Measurements in Open Channels. Each time **EWQ** sampling is performed on lakes, lake levels shall be measured using procedures approved by the department.

As noted, the department may consider data for establishing the **EWQ** from a federal or state agency, the regulated entity, the public, or any other source as long as the data:

- were collected in accordance with an approved quality assurance project plan;
- were collected using specified assessment or sample collection and analysis protocols; and
- meet Missouri’s credible data and data interpretation requirements specified by Missouri's 303(d) listing methodology document (*Methodology for the Development of the 2006 Section 303(d) List in Missouri*, or subsequent approved revisions).

Appendix 2 provides an example of an approach to determining **EWQ** through statistical modeling.

#### c) Pollutants of Concern

Dischargers will be required to generate **EWQ** for all **POCs** associated with the proposed discharge unless the discharger wishes to assume that significant degradation will result. **POCs** are those pollutants reasonably expected to be present in the discharge and that pose a reasonable potential for significantly degrading the quality within the receiving waters.

In addition to the **POCs**, regulated entities may also be requested to provide water quality data or representative values for parameters necessary to determine the appropriate value range of water quality criteria (e.g., pH, temperature, hardness) or to assess synergistic effects of multiple pollutants. If a dissolved metal is a **POC**, a regulated entity may also be requested to provide the information necessary to translate the total metal present in the discharge to an in-stream dissolved concentration. Again, the importance of consultation between **EWQ** data generators and the department staff prior to **EWQ** data generation cannot be overstated.

d) Using Models or Data to Establish **Existing Water Quality**

Generators of **EWQ** models or data are expected to provide documentation of their adherence to approved or established protocols and certification that the submitted information is accurate and complete. Qualified models or data will be reviewed in order to determine the **EWQ** on a **pollutant-by-pollutant basis** for each **POC**.

In general, the **EWQ** may be expressed as an arithmetic mean for each pollutant of concern (See Appendix 2).

For data sets or models that show pollutants to be below detectable levels, **EWQ** may be considered to be zero where the reported detection limit is less than or equal to the applicable **WQS** for the pollutant. The department will consider the concentration of a pollutant reported as “non-detect” or “less than” as one-half the detection limit where the detection limit is greater than the applicable standard for a pollutant when calculating the arithmetic mean for the **EWQ** determination.

Data generators should make every effort to use the most sensitive, practical analytical methods available. The use of less sensitive analytical methods may cause rejection of the data set. *The department will use the current **EWQ** value established for a particular pollutant in a surface water to judge the impact of all subsequent proposals for discharges involving that pollutant.* **EWQ** reassessments may be appropriate if the data used in the original determination are shown to be inaccurate or to have been negligently or fraudulently generated, or if the water quality of the **segment** is believed to be significantly improved over that which existed at the time of the original **EWQ** determination. Affected stakeholders may request that the department authorize an **EWQ** reassessment under those circumstances.

2. Relationship of Antidegradation to **Beneficial Uses** and Classifications

This antidegradation procedure applies to all **waters of the state** regardless of use designations or water classification. The level of antidegradation review is determined by the quality of the water. However, the level of review chosen must not result in the loss or impairment of an existing or designated **beneficial use**.

a) Protecting **Beneficial Uses** of Classified Waters



The establishment of a tier review level on any pollutant shall not affect the existing uses, or the attainability of designated uses, on classified waters. Waters with **beneficial uses** shall be protected for those uses until such time as a Use Attainability Analysis (UAA) demonstrates the use as unattainable and the designation is removed from the standards.

b) Protecting Fishable/Swimmable Uses of Unclassified Waters

The establishment of a tier review level on unclassified waters shall not affect the attainability of the presumed uses of whole body contact recreation and aquatic life protection.

3. Determining Event-Specific and **Cumulative Degradation**

When justified under section II.A of this document, degradation may occur through the reduction of the waters **available assimilative capacity**. If the reduction of this capacity will be greater than 10 percent as a result of a single discharge event, or greater than 20 percent from cumulative discharges, then a Tier 2 review will be required. The reduction must be calculated for each **pollutant of concern**. *Existing facilities that are applying for permit renewals with no new or expanded discharge would not be required to undergo a comprehensive Tier 2 review because their existing effluent is already deemed to compose part of the receiving water's EWQ.*

By definition, at the Tier 2 review levels, **EWQ** is better than the minimum **WQS**. The difference between observed **EWQ** and the **WQS** constitutes the **available assimilative capacity** for each pollutant of concern under study. Figure 3 provides a simplified visual representation of **available assimilative capacity** for pollutant *x*.

In this example, the applicable **WQS** for pollutant *x* is 10 mg/L and the observed **EWQ** measurement is 3 mg/L. The total **available assimilative capacity** for pollutant *x* is the load associated with the difference between the two concentrations at the critical stream flow condition (e.g., an activity that would cause **EWQ** concentrations of pollutant *x* to increase from 3 mg/L to 10 mg/L and would consume all of the total **available assimilative capacity** of the surface water).

Tier 1 review allows all of the available assimilative capacity to be used. Use of the total available assimilative capacity can also be allowed in Tier 2 review levels if the alternatives analysis and socio-economic analysis outlined in section II.E of this document and the intergovernmental coordination and public participation conditions outlined in section II.F are satisfied.

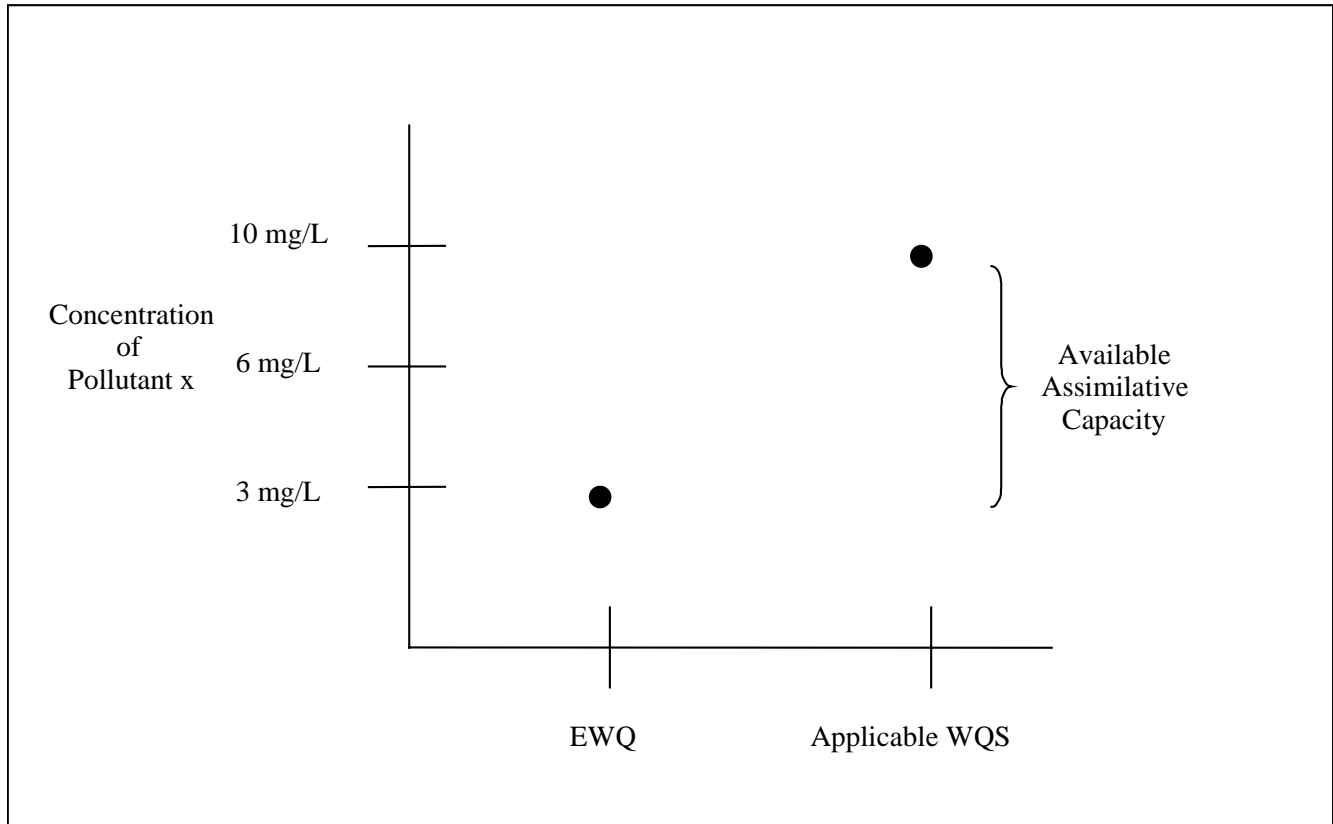
In Figure 3, the total **available assimilative capacity** is the difference between the required **WQS** for the receiving water and observed (i.e., existing) water quality, or:

$$10 \text{ mg/L} - 3 \text{ mg/L} = 7 \text{ mg/L}$$

Ten percent of 7 mg/L is 0.7 mg/L. Thus an activity in a Tier 2 situation would be allowable (i.e., would be **minimal degradation**) if it did not cause the water quality in the receiving **segment** to be equal to or exceed the combined values of **EWQ**

plus the minimal degradation limit. In this example, **EWQ** (3 mg/L) plus the **minimal degradation** limit (0.7 mg/L) combine to equal 3.7 mg/L for pollutant *x*.

**Figure 3.** Simplified representation of water body assimilative capacity for pollutant *x*.



The calculations noted above are to be executed for critical flow or lake/reservoir water level conditions for the pollutants of concern. Critical flow conditions are the point in time in which the **beneficial uses** within a water of the state are most susceptible to the effects of pollution, which is generally but not necessarily when a stream is at or below its **Seven Day Q10 (7Q10) flow**. A lake's critical condition shall be determined on a case-by-case basis but would normally be when the surface water is at or below its ordinary or base level.

The following calculations should be used to determine if a discharge or "waste load allocation" (WLA) to a stream would result in more than **minimal degradation**:

Calculate for the total pollutant load allowable in new discharge (WLA):

$$WLA = [WQC*(Q_s+Q_d)-C_s*Q_s]*CF$$

Where:

WQC = Water Quality Criterion (represented as a concentration, e.g., mg/L)

Qs = stream flow (7Q10 or other representative flow)

Qd = average daily design flow of discharge in cubic feet per second (cfs)

Cs = pollutant concentration in stream

CF = Conversion Factor (to convert concentration to mass - see description below)

Convert new discharge load into mass:

$$Qd \cdot Cd \cdot CF$$

Where:

Cd = Discharge concentration

Calculate percent of WLA:

$$(New\ load/WLA) \cdot 100$$

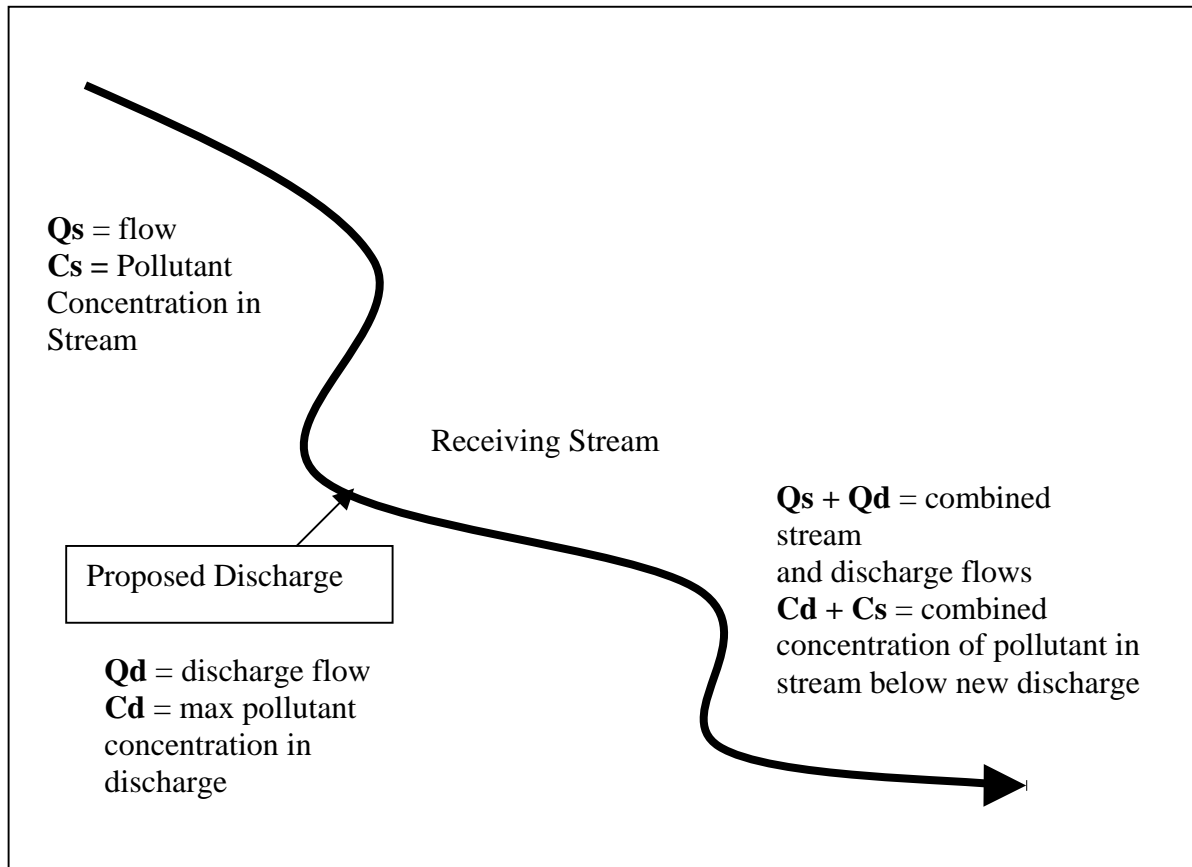
If the percent WLA is less than 10 percent, minimal degradation would occur.

Pollutants must be converted to units of mass to calculate a pollutant load. The conversion factor (CF) in the above calculations converts a pollutant concentration into units of mass. To calculate a pollutant load as pounds per day from an effluent concentration recorded as milligrams per liter (mg/L) and an effluent flow rate recorded in cubic feet per second (cfs), the factor of 5.40 may be used. This factor was derived from the following equation:

$$\frac{mg}{L} \cdot \frac{ft^3}{s} \cdot \frac{0.000002205 \cdot lbs}{mg} \cdot \frac{28.32 \cdot L}{ft^3} \cdot \frac{86,400 \cdot s}{day} = 5.40$$

Figure 4 illustrates the relationship between the factors used in calculating the waste load allocation for a stream.

**Figure 4.** Diagram depicting key factors in calculating a Waste Load Allocation to a stream.



Methods for calculating for minimal degradation for various scenarios are available in **Appendix 1** of this document.

## B. Review for Alternatives to Degradation

### 1. Identifying **Less-Degrading** and **Non-Degrading Pollution Control** Measures

For any proposed discharge, there may be a number of less-degrading and/or non-degrading pollution control measures that might provide cost-effective and reasonable alternatives for preventing or minimizing the degradation of a water. *Under Missouri's antidegradation implementation procedures, applicants are required to determine whether or not a new or expanded discharge to any water would result in a reduction of more than 10 percent of the water's **available assimilative capacity**. If it will, the applicant must provide an analysis of discharge alternatives as part of their discharge permit application. **Less-degrading or non-degrading pollution control alternatives** identified and assessed during this*

process should be reliable, demonstrated processes, or practices that can be reasonably expected to result in a defined range of treatment or pollutant removal.

If experimental or unproven methods are proposed, the department may request information on previous applications of the method, effectiveness, transferability (if applicable), costs and other information as appropriate. Applications containing proposals for new or experimental methods will be required to append information regarding likely performance results. Such applications may be approved at the discretion of the department with the condition that if the proposed technology does not meet projected pollutant control targets, the applicant must adopt conventional or other pollution control measures that meet state antidegradation requirements.

Pollution control alternatives to be evaluated when a proposed discharge will result in more than minimal degradation of the receiving water **segments** include, but are not limited to, the following:

#### Examples of Non-Discharge Alternatives

- Pollution prevention and treatment process changes
- Recycling/reusing wastewater (i.e., closed loop systems)
- Holding/transport facilities for treatment/discharge elsewhere
- Groundwater recharge (i.e., soil-aquifer treatment)
- 100 percent reuse

#### Examples of Non-Degrading or Less-Degrading Alternatives

- Advanced or innovative biological/physical/chemical treatment
- Pollution prevention and process changes
- Improvements in the collection system
- Improved operation and maintenance of existing treatment system
- Seasonal or controlled discharges to avoid critical periods
- Alternative discharge locations
- Reduction in the scope of the proposed project

Applicants will be expected to address reasonable and cost-effective alternatives, or a mix of alternatives, in their evaluations, including approaches that are completely different from conventional practice, e.g., land application (subsurface/surface), deep well injection, alternative discharge locations, and other alternatives. The department staff and the applicant will meet to discuss these and other issues early in the process. It is the responsibility of the applicant to screen for and propose a list of available, cost-effective alternatives that will be evaluated in detail by the department. The department may require that additional alternatives be analyzed.

It is recommended that the applicant also document any alternatives that were determined to be unreasonable or not cost-effective. The intent of the alternatives review process is to ensure that degradation of water quality does not occur unless no cost-effective, reasonable alternative(s) exists. If the project results in

degradation even after applying reasonable, cost-effective alternatives, the proposal must demonstrate

- important social or economic development as outlined in section II.E of this document;
- that the level of water quality necessary to protect beneficial uses is maintained;
- that all cost-effective and reasonable best management practices for nonpoint source control are implemented; and
- that the highest statutory and regulatory requirements for all new and existing point sources are achieved.

## 2. Evaluating Effectiveness and Reasonableness of Alternatives

Applicants are required to provide substantive information pertaining to both the effectiveness and reasonableness of each pollution control alternative considered. This information should help define the overall value or desirability of each alternative so that comparative reviews under the following sections are performed only on discharging alternatives that are generally acceptable engineering practices.

A review for "effectiveness" shall assure that the considered alternative is capable of achieving compliance with the WQS and any applicable technology-based standards. Alternatives unable to achieve these requirements are not "effective" and shall not be selected for further analysis under this antidegradation procedure.

A review for "reasonableness" should consider whether or not the alternative poses unnecessary or ineffective treatment, or involves a treatment component that offers small gains in effluent quality when compared to its cost. For example, an effective treatment technology that achieves a pollution reduction equal to 5 percent of the water's **available assimilative capacity** but is 25 percent more costly than the next effective treatment option may not be a reasonable alternative.

When determining the desirability of treatment options, the applicant should include impacts on the overall natural environment (i.e., land, air, and water) resulting from implementation of the alternative. The types of impacts evaluated during this process should include, but are not limited to the following:

For all activities:

- Sensitivity of stream uses
- Need for low-flow augmentation
- Sensitivity of groundwater uses in the area
- Potential to generate secondary water quality impacts (storm water, hydrology)
- System or technology reliability, potential for upsets/accidents
- Effect on endangered species
- Cumulative impacts from multiple sources

For all discharges:

- Nature of pollutants discharged
- Dilution ratio for pollutants discharged
- Discharge timing and duration

Review of these impacts might be on a qualitative or quantitative basis, as appropriate. Other feasibility factors that should be considered during the review include the technical, legal and local considerations of the various alternatives examined. The schedule and the estimated time of completion of the project should also be provided for each alternative discussed.

### 3. Determining the Cost of Alternatives

An assessment of costs related to the alternatives summarized above is necessary to determine whether or not a prospective alternative pollution control measure is reasonable from a cost perspective. General cost categories include:

- Capital costs
- Operating costs
- Other costs (one-time costs, savings, opportunity cost, salvage value)

Costs associated with lost economic opportunities resulting from the use of a pollution control measure may be included in the cost assessment as appropriate. For example, the applicant may include costs for lost economic opportunities to use lots in a proposed subdivision for spray irrigation rather than housing, or losses related to a process change that results in a missed production run. These costs must be explained and documented as part of the overall alternatives analysis. However, speculative value, i.e., that which is associated with potential future development rather than that associated with an actual proposed project, should not be included in cost projections.

### 4. Comparing the Costs of Alternatives

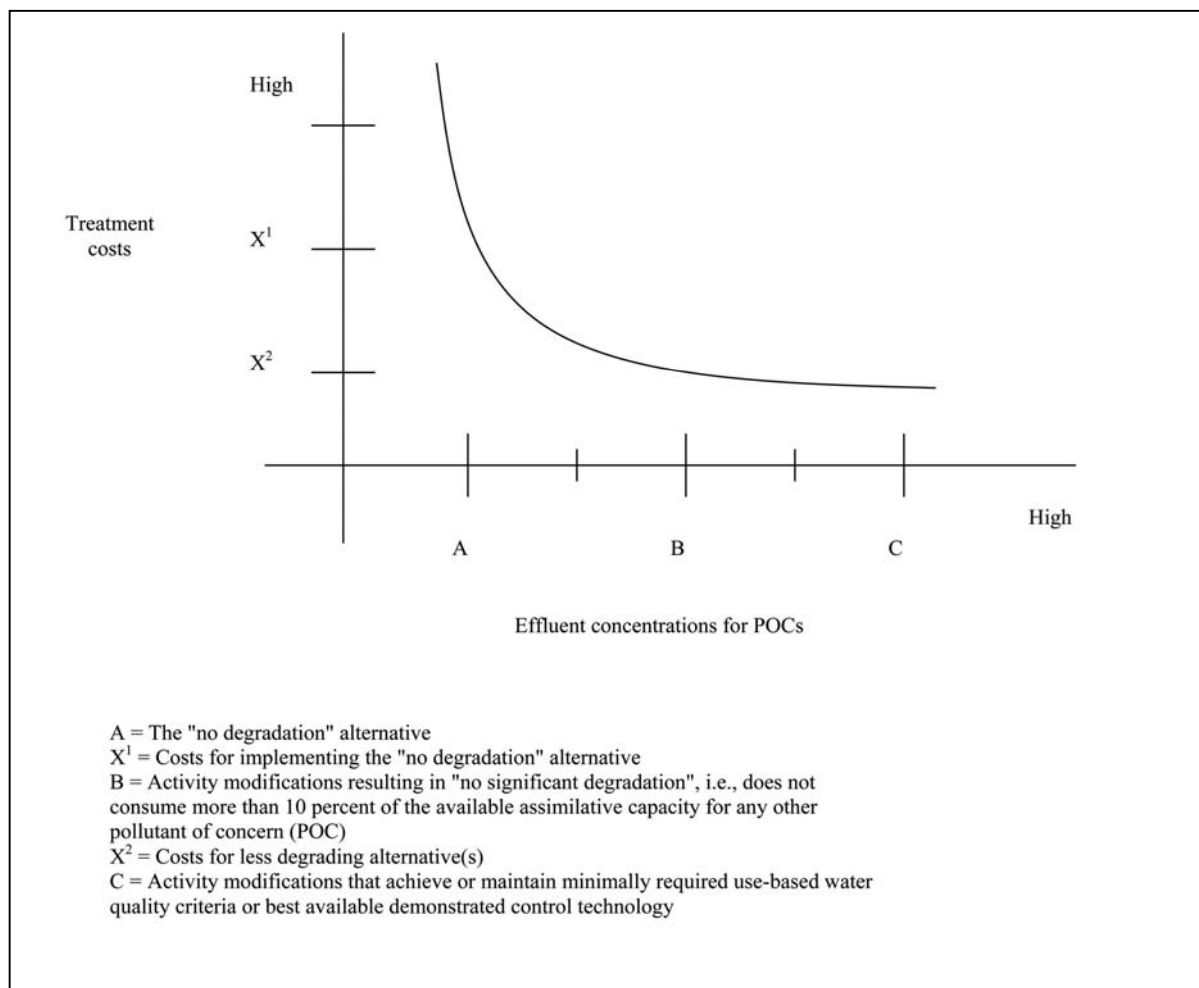
Comparing the cost of pollution control measures is important in the antidegradation review process since cost “reasonableness” is one of the tests for requiring adoption of alternatives in cases where discharges will result in more than **minimal degradation**. In reviewing costs for a variety of discharge scenarios (as entered in Part 3, Worksheet 2 of Appendix 3 of this document), three reference costs must be identified (See Figure 5). These scenarios represent the “base” costs associated with three levels of treatment or control of pollutants.

- The cost of treatment that results in no discharges of any **pollutants of concern** (the “no-discharge” cost).
- The cost of treatment that produces an effluent that results in no, or **minimal degradation** of the receiving water, i.e., that does not consume more than 10 percent of the available assimilative capacity for any POC.

- The cost of treating an effluent to a quality that meets specific effluent/best available technology (BAT) limits or water quality criteria for any/all **pollutants of concern** (i.e., the minimum Tier 1 requirement).

As noted above, the base cost for comparing the reasonableness and cost-effectiveness of **less-degrading** or **non-degrading alternatives** (Level C in Figure 5) includes whichever of the following is more stringent: the cost of producing an effluent that meets water quality standards, or the cost of meeting federal technology-based standards (e.g., Effluent Limitation Guidelines (ELGs), Best Available Technology Economically Achievable (BATEA), etc.). Applicants are also required to submit cost information to the department for base pollution control measures as defined above and alternative pollution control measures that would result in no **significant degradation** (Level B in Figure 5), and any available alternatives to the original proposal. The department may request cost or other information regarding preventing degradation (Level A in Figure 5). The applicant must use the alternatives analysis as a means to justify a preferred alternative. If the

**Figure 5.** Comparison of treatment costs to produce effluents of varying quality.





preferred alternative is at Level C in the diagram, the department may request additional analyses or information to explore the reasonableness of less-degrading alternatives (something above Level C) that would more closely match the socio-economic importance threshold as described in Section II.E.6 of this document.

## 5. Selection of a Preferred Alternative

The preceding discussion describes the approach that will be followed by the department for determining whether or not less- or non-degrading alternatives to the proposed discharge will be required to prevent significant degradation of Missouri surface waters. The following steps summarize the alternatives analysis process and other relevant actions during antidegradation reviews for Tier 2 review levels:

Based on characterizations of the proposed discharge, **existing water quality (EWQ)**, and projected impacts on the receiving water **segment**, the applicant will determine whether or not the proposed discharge will more than **minimally degrade** water quality, i.e., consume more than 10 percent of the **available assimilative capacity** for any **pollutant of concern**.

If it is determined that more than **minimal degradation** would likely occur due to the proposed discharge, an analysis of **less-** or **non-degrading alternatives** to the proposed discharge will be required.

The applicant will be required to submit cost information for pollution control measures associated with the proposed discharge. In addition, the applicant must identify **less-** and **non-degrading alternatives**, and the effectiveness, cost and feasibility associated with each alternative

*As a result of the above analysis, the applicant must identify the most effective and reasonable pollution control alternative. This will be the preferred alternative unless another alternative is discussed under section II.B.5 of this document.*

If the preferred option (i.e., pollution control alternative or mix of alternatives) will only result in **minimal degradation** of the receiving water **segment**, the antidegradation review may be concluded. If the preferred option (i.e., pollution control alternative or mix of alternatives) will result in more **than minimal degradation** of the receiving water, the applicant will be required to conduct a socio-economic analysis (SEA) under section II.E of this document. In addition to the social and economic importance, in order to permit degradation of a water, the applicant must demonstrate that all reasonable alternatives to degrading water quality have been evaluated, the proposed discharge fully protects existing and designated beneficial uses, and achieves the highest statutory and regulatory requirements for existing and new point source discharges. In addition, the department must document that approved, cost-effective, and reasonable best management practices are implemented for nonpoint source control in the watershed above the proposed discharge in accordance with section II.D of this document.

## 6. Expedited Review for Advanced Treatment Systems

The analysis for discharge alternatives (beyond evaluating a non-discharging alternative) may be unnecessary if a discharger proposes a treatment system that is generally recognized by professional engineers as offering the maximum pollutant reduction practicable for the type of wastewater received. This section of this document creates a way to expedite the antidegradation review on new or expanded systems that use treatment methods generally known to achieve the best treatment possible. This expedited approach to an antidegradation review is aimed at encouraging proven methods that achieve a greater level of pollutant reduction but that are often avoided because of their cost. In that sense, a socio-economic review also seems unnecessary. The basic premise behind this approach is that the antidegradation review will likely justify the proposed system, so burdening the discharger and the department with completing the worksheets seems unwarranted for those pollutants for which a discharge is substantially controlled by the advanced treatment system.

At this time, the expedited approach is offered only for pollutants of concern common to domestic discharges. Worksheets 2, 4, 5a, 5b and 5c (See Appendix 3 of this document) will not be required for the pollutants listed below if an advanced treatment system is proposed that achieves the following effluent quality:

Advanced Treatment Permit Limits

	Maximum Daily Limit	Average Monthly Limit
BOD <sub>5</sub> , mg/L	9.0	4.5 (6.4 ML*)
TSS, mg/L	5.8	2.9 (5.0 ML)
Total Phosphorus as P, mg/L	0.80	0.40
Total Nitrogen as N, mg/L	13.6	6.8
Total Ammonia as N, mg/L	2.0	1.0
Nitrate plus Nitrite as N, mg/L	13.6	6.8
Dissolved Oxygen as O <sub>2</sub> , mg/L Minimum		
April through November 30	5.0	6.2
December 1 through March 31	5.8	7.2
pH Range 6.5 – 9.0		
Total Residual Chlorine as Cl <sub>2</sub> , mg/L	0.0033 (0.13 ML)	0.0016 (0.13 ML)
Total Aluminum as Al, mg/L	0.75	0.38
Total Iron as Fe, mg/L	0.49	0.25
Fecal Coliform, colonies/100ml	328	164
Oil & Grease, mg/L	15	10

Note that chlorine, iron, and aluminum permit limits are applicable only if these chemicals are used in the treatment processes reactants, disinfectants, or coagulants.

\*Note ML (minimum level) represents reportable/compliance level with current technology for measurement.

Note that WET tests, sludge testing and other conditions will be in an actual permit.

Treatment processes available to achieve an effluent quality such as this may include screening, anaerobic biological reactor, anoxic biological reactor, aerobic biological reactor, secondary

clarifiers, sludge return from the clarifiers to the anaerobic unit (through the screen), mixed liquor recycle from the aerobic unit to the anoxic unit, tertiary filters, chlorination with detention, sludge digestion and storage, flow equalization, dechlorination, and reaeration.

The above effluent quality represents what is generally achievable when a community has developed an effective rate structure and billing program and is free of other major infrastructure demands. Achieving this level of treatment is considered as "good as it gets", and therefore any other alternative, besides no discharge, would not result in further reduction of pollutants. Communities that state they do not have the capital to finance an advanced treatment system will be required to explain the economic burdens associated with the alternatives considered by completing Worksheets 5a, 5c and 5c (See Appendix 3 of this document).

While the above advanced treatment will avoid an alternatives analysis and a socio-economic review, the state must still assure compliance with other water quality standards, document the implementation of approved non-point source management plans and allow for public participation in the permitting decision.

#### C. Review for Conformance to Technology-Based Requirements

Prior to authorizing any proposed activity that would degrade a water, the department shall assure compliance with the state-required controls and federal effluent limitation guidelines on all point sources discharging to the water **segment** receiving the new or expanding discharge. Compliance shall be considered assured if all permits are in effect and discharges from permitted facilities that are not in significant noncompliance and/or implementing all required best management practices. Appropriate enforcement action and/or compliance schedules on facilities that are out of compliance will satisfy the assurance requirement.

#### D. Review for Implementation of Nonpoint Source Controls

In March 1994, EPA transmitted guidance regarding nonpoint sources (NPS) and the antidegradation provisions of the water quality standards, with clarifying remarks for antidegradation implementation. EPA's regulatory interpretation of 40 CFR section 131.12(a)(2) is that federal antidegradation policy does not require the department to establish best management practices (BMPs) for nonpoint source pollution control where regulatory programs requiring BMPs do not exist. The Clean Water Act leaves it to the states to determine what, if any, controls on nonpoint sources are needed to provide for attainment of state water quality standards. States may adopt regulatory or voluntary programs to address nonpoint sources of pollution. 40 CFR section 131.12(a)(2) does not require that states adopt or implement best management practices for nonpoint sources prior to allowing point source degradation of a water. However, where a state has adopted a regulatory program for nonpoint source pollution control, the state must assure that such controls are properly implemented before authorization is granted to allow degradation of water quality. EPA also interprets 40 CFR section 131.12(a) as prohibiting degradation as unnecessary to accommodate important

economic and social development if it could be partially or completely prevented through implementation of existing state-required BMPs.

Nonpoint source discharges are not exempt from antidegradation requirements. However, nonpoint source discharges of pollutants are not currently regulated and there are no regulatory control documents (e.g., like a permit) that are subject to antidegradation review. Consequently, antidegradation review requirements do not apply to nonpoint source activities.

## E. Determining Socio-Economic Importance (SEI) of the Proposed Discharge

### 1. Requirements for an Analysis of Socio-Economic Importance

Prior to authorizing any proposed discharge that would significantly degrade water quality, an analysis of SEI of the discharge must be conducted. The analysis must be made for the least degrading, cost-effective alternative identified in accordance with section II.B of this document.

There are several steps in determining SEI. First, the applicant identifies the affected community. Second, the applicant conducts an inventory of factors that characterize the social and economic conditions of the affected community. Next, the applicant provides information necessary to compare the importance of the discharging activity with the impacts of degrading water quality.

The applicant must document these findings and report them to the department. The department then reviews the information and makes a preliminary determination of the acceptability of allowing the degradation of water quality.

### 2. The Role of the Applicant

The role of the applicant is to demonstrate the socio-economic importance of allowing degradation of a water. The applicant must complete *Worksheets 5a, 5b* and *5c* (See Appendix 3 of this document).

In *Worksheet 5a*, the applicant provides baseline information on the community population, median household income, unemployment rates and annual tax revenues. This information creates a measurement of "wealth" or "prosperity" with which the costs or impacts of maintaining water quality can be compared. The second half of *Worksheet 5a* requests the estimated costs for the pollution control needed to prevent the degradation of water quality. These costs will be used to determine whether or not a community would experience a significant economic burden as a result of maintaining water quality.

*Worksheet 5b* presents a series of questions to assist in assessing the significance of the socio-economic boost a community would receive from avoiding the economic burden. The positive factors to be examined in this analysis may include, but are not limited to:

- Creating, expanding, or maintaining employment.
- Reducing the unemployment rate.
- Increasing production.
- Increasing median household income.
- Reducing the number of households below the poverty line.
- Increasing needed housing supply.
- Increasing the community tax base.
- Providing necessary public services (e.g., fire department, school, and infrastructure).
- Correcting a public health, safety, or environmental problem.
- Improving quality of life for residents in the area.

The applicant may choose to describe additional factors as needed to improve its SEI analysis. All information provided should be based upon the most current available data (e.g., unemployment statistics, census data, etc.). In addition to identifying the treatment or control technology that achieves the best balance between maintaining water quality and allowing for important socio-economic development, the applicant must also demonstrate that the proposed discharge fully protects beneficial uses and achieves the highest statutory and regulatory requirements for existing and new point source discharges.

### 3. The Role of the Department

Prior to authorizing any proposed activity that would significantly degrade water quality, the department shall ensure that the proposed activity will provide important social or economic development in the area in which the waters are located and that these important gains are properly balanced with the economic burden of providing pollution control. Generally, the demonstration of socio-economic importance should not result in applicants receiving a waste load allocation that utilizes most of the water's assimilative capacity unless the socio-economic conditions warrant that extent of degradation. *As part of the alternatives analysis described in section II.B of this document, the applicant should identify the treatment or control technology that achieves the highest level of treatment or control of pollutants while serving the socio-economic needs of the community in accordance with this document.*

The department may also consider the applicant's demonstration when balancing the socio-economic benefits and environmental costs associated with the degradation of water quality. These considerations should be presented in the material offered for public review in accordance with section II.F of this document and in the Administrative Record of Decisions described in section VII of this document.

When information available to the department is not sufficient to make a determination regarding the socio-economic benefits or environmental impacts associated with the proposed activity, the department may require the project applicant to submit additional information to support a preliminary determination.

For private entities, the department may request information to determine the effects of greater treatment on profits in order to ascertain why a less-degrading treatment alternative was not chosen. Such a request would only be necessary if the proposed alternative did not appear to be justified by the alternative analysis as being the preferred alternative.

#### 4. Preliminary Determination of Socio-Economic Importance

Once the department has reviewed available information pertaining to the socio-economic importance of the proposed activity, the department shall make a preliminary determination regarding how the socio-economic importance balances with changes to water quality. If the department determines that the proposed activity has socio-economic importance and the highest applicable and established statutory and regulatory requirements are achieved, it will prepare draft determination for public review under section II.F of this document. This preliminary determination also becomes part of the **Administrative Record of Decisions** described in section VII of this document.

If the department makes a preliminary determination that the socio-economic importance of the preferred treatment alternative is not balanced with the economic burden of providing additional treatment, the department shall post its antidegradation review findings and the preliminary decision to deny the proposed activity. This preliminary determination also becomes part of the **Administrative Record of Decisions**.

#### 5. Public Participation in the Determining the Socio-Economic Importance

To encourage efficient processes, the antidegradation reviews for permitted facilities will utilize the public participation procedures that are available through the permitting process. Also, the public will benefit from having a permit decision (i.e., the proposed effluent limitations and/or required BMPs) available for review in conjunction with the antidegradation review findings. Having these processes presented simultaneously allows the public to examine how the two processes relate. Because of this coordination of actions, a preliminary determination on the antidegradation review may be on record for some time before it is formally presented for public review and comment.

The department may evaluate how the proposed degradation in water quality appropriately balances with the socio-economic importance of (or need for) an increased discharge.

#### F. Public and Interagency Participation in Antidegradation Reviews

Public participation is a component of the antidegradation review process. Public notice of antidegradation review findings, solicitations of public comment, and maintenance of antidegradation review documents as part of the public record help ensure that interested parties can be engaged and involved throughout the review process. In addition, intergovernmental coordination and review and a public hearing are required

prior to any action that allows degradation of water quality in a surface water afforded Tier 2 review. This requirement provides an additional level of involvement and input during antidegradation review discussions.

This chapter outlines public participation and intergovernmental coordination and review requirements. It should be noted that the processes for both follow existing state rules regarding public notice, comment, and records. Antidegradation reviews for permitted facilities will employ the public participation procedures that are available through the permitting process (e.g., draft permits, Fact Sheets, Water Quality Review Sheets, opportunities to comment, etc.). The Fact Sheet will include a discussion on the antidegradation review. Appeals of antidegradation reviews received by the department also adhere to current rules and practice.

#### 1. Public Notification Requirements

Public notice and opportunity for public comment will be provided for all antidegradation reviews. Public notice and opportunity for comment may be combined with other public participation procedures, such as those related to permitting processes or intergovernmental coordination and review procedures.

Discharges that may result in degradation of waters can only be approved after the department allows for public comment on whether degradation should be allowed under the general public hearing procedures prescribed at 10 CSR 20-6.010 and the department makes all of the following findings:

- The level of water quality necessary to protect beneficial uses is fully maintained. Water quality shall not be degraded to a level that does not comply with applicable water quality standards.
- The highest statutory and regulatory requirements for new and existing point sources are achieved.
- All cost-effective and reasonable best management practices for nonpoint source pollution control are implemented.
- Allowing degradation of water quality is necessary to accommodate important economic or social development in the area where the surface water is located.

After an antidegradation review has been conducted for a discharge that may result in significant degradation, the public notice will include a notice of availability of

- the decision as to whether or not the proposed discharge meets antidegradation requirements;
- determination of projected impacts on **EWQ**;
- findings and determinations from the alternatives analysis, when required;
- the conclusions of any social and economic evaluation of the proposed activity, where necessary; and
- a description of the surface water that is subject to the antidegradation review.

Unless public participation on the antidegradation review is incorporated into a permitting process, a public notice will be provided through the appropriate legal

advertisement in a qualified newspaper with the largest circulation for the county where the discharge will occur. The notice will identify the action being considered, list all beneficial uses identified of the surface water, and call for comments from the public regarding the proposed discharge.

All antidegradation review findings shall be documented by the department and made part of the **Administrative Record of Decisions**. *Review documents, including EWQ assessments, beneficial uses, the level of review conducted, alternatives analyses, social/economic studies, impacts analyses, and any decisions or findings, will be made available to the public.*

## 2. Opportunities for Public Participation

Public participation in Missouri's water quality antidegradation program can be broad or specific. Opportunities for broad participation include involvement in the triennial review of the water quality standards program (i.e., use designations, water quality criteria determinations, antidegradation review requirements) and participation in rule development relative to permitting processes. In addition, any interested party may nominate a water **segment** for review at the Tier 3 level by following the procedure for consideration outlined under section I.C of this document. Finally, interested groups can conduct volunteer monitoring to support **EWQ** determinations.

Wherever possible, the department will seek to integrate public participation regarding antidegradation reviews with existing public participation procedures (e.g., permitting procedures). Public notice, opportunity for public comment, and opportunity for a public hearing will be provided for all activities approved after a Tier 1, 2, or 3 antidegradation review, as noted above. Public hearings and the collection of public comments on antidegradation reviews related to permit actions will be integrated into the existing hearing and comment provisions of permit processes.

When antidegradation reviews and notices of findings related to such reviews are incorporated into permit hearings or collection of public comments under the permit process, any required notice of the permit hearing or solicitation of comments shall note that elements of the antidegradation review (e.g., decisions, analyses, studies, water quality impacts) are also under consideration. Public participation processes that may include opportunities for antidegradation review and public involvement include

- The permit issuance process for individual or general permits, which must abide by the requirements of 10 CSR 20-6.
- Permitting, planning, or funding actions, which require public notices, comment opportunities, and meetings as part of the application process and planning requirements.
- Individual Clean Water Act §401 water quality certifications, which specify public participation requirements executed by the department.



- Provisions for public participation in antidegradation reviews and related matters as outlined in the state's Continuing Planning Process.
- Changes in the review level given to any pollutant (e.g., Tier 2 to Tier 1).

### 3. Intergovernmental Coordination and Review

Intergovernmental coordination is required prior to approving a discharge that would degrade a surface water protected at the Tier 2 level. This requirement seeks to ensure that all relevant public entities at the local, state, and federal levels are aware of any proposal to degrade water quality and are provided with an opportunity to review, seek additional information, and comment on the proposal. The intergovernmental coordination and review process occurs prior to the issuance of any final determination on the social and/or economic importance of the proposed discharge, and may occur in tandem with public notice procedures outlined in the previous section. The time period afforded to commenting agencies will be consistent with the requirements for submission of public comments.

Intergovernmental coordination requirements will be satisfied by following Element 5 of the Continuing Planning Process (CPP). Element 5 may be reviewed by contacting the department for a copy of the CPP or accessing the department's Web site.

Information to be made available to the agencies will include summary information on the proposed activity, the receiving water **segment**, the **EWQ** of the receiving water **segment**, the tier designation, estimated impacts of the proposed activity upon the receiving waters, the alternatives reviewed, and the projected social or economic importance of the proposed activity.

Comments from the intergovernmental coordination process will be forwarded to the appropriate permit writer or other department staff for summarization and reporting to management. Once the intergovernmental coordination and public notice requirements outlined above are satisfied, the department shall make a determination concerning the social or economic importance of the proposed activity in the area in which the affected receiving waters are located. All determinations, including determinations to prohibit the activity, shall be documented and made a part of the administrative record.

### 4. Appeals of Antidegradation Review Decisions

Final decisions made by the agency based on antidegradation reviews (e.g., permit issuance or denial) can be appealed to the **Clean Water Commission**. Provisions for appeals are found in regulation at 10 CSR 20-6.020 and §644.051.6 RSMo.

## III. Permit Considerations

The department must ensure that water quality associated with the existing use(s) for each receiving water **segment** is maintained and protected, and that antidegradation requirements are considered in the development of permit limits.

The primary antidegradation implementation activities will occur when water quality-based effluent permit limits are developed for the individual permit. The department will assess existing water quality for the purpose of assisting in the development of permit limits. In developing those limits, the department will use both internal and applicant-supplied data, identify existing and beneficial uses of the receiving water and analyze the impacts of the discharge, as well as cumulative discharges, that might affect the **assimilative capacity** of the receiving surface water for relevant **pollutants of concern**.

Because the permit limits have a significant impact on the treatment processes, technologies, and procedures used by the applicant, it is important that the department be notified early as to the nature of the discharge, discharge location, and effluent characteristics. Developing permit limits requires collection of a considerable amount of information on the receiving water, the applicant's discharge, and other activities in the drainage area. Early notification will ensure that the information collection process begins well before the applicant needs a permit to conduct planning activities, design facilities, or proceed with project construction. When the applicant intends to collect water quality data in preparation for an antidegradation review, the department recommends that the applicant meet with the department in a pre-application conference at least one year prior to the expected date of permit issuance. Applicants seeking funding through state managed grants or loans should consider visiting with the state at least two years in advance of permit issuance.

The following section provides an overview of how permit limits will be developed and issued under the state's antidegradation implementation procedures. Much of the antidegradation review for a point source discharge regulated by an individual permit will occur during the permitting process. Proposed discharges that may degrade waters protected at the Tier 2 level must undergo a comprehensive antidegradation review to determine whether less-degrading or non-degrading alternatives exist and whether significant degradation is justified to accommodate important social economic and social development in the area of the point source discharge.

Prior to authorizing any proposed activity that would **significantly degrade** water quality, the department shall assure compliance with the state-required controls on all point sources discharging to the water **segment** receiving the new discharge. Consequently, during each permit review, the department will evaluate any potential cumulative impacts to downstream waters and incorporate permit requirements to ensure compliance with all aspects of the antidegradation rule by all of the regulated activities affecting the same **segment**.

Under Missouri's antidegradation program, **degradation** is defined as the consumption of more than a minimal amount of assimilative capacity (see definition for **minimal degradation**) of the receiving water for any **pollutant of concern** associated with the discharge during **critical flow** conditions. The objective of the antidegradation policy is to ensure that permits issued for discharges to waters achieve no degradation when possible and achieve minimal degradation if a discharge is unavoidable. *Where more than **minimal degradation** is warranted because of socio-economic importance, the degradation should be allowed only to the extent necessary to accommodate the important socio-economic*

*need but in no circumstances must the discharges result in exceeding the water quality standards for protecting all beneficial uses.*

Early notification and consultation between the applicant and the department will help ensure that the permitting process proceeds efficiently. The following steps outline the general procedure for processing a permit:

- Applicant notifies the department of intent to apply for permit coverage.
- The department determines eligibility for general permit or site-specific permit coverage.
- Applicant or the department collects **EWQ** information for applicable pollutants of concern.
- The department develops draft permit limits based on effluent guidelines, applicable water quality standards, **EWQ**, and antidegradation requirements.
- Applicant applies for permit after consultation with the department.
- The department develops final permit limits for **pollutants of concern**.
- The department issues permit to applicant after antidegradation review.

Regulated discharges that may temporarily degrade waters protected at the Tier 3 level must comply with the antidegradation requirements applicable to that review level (i.e., provide proof that the degradation is only temporary) before a permit will be granted. *Any discharge to an ONRW or OSRW will require a site-specific permit or individual §401 certification to ensure that impacts will be temporary and that the public can participate in the decision.*

#### A. General Storm Water Permits

An additional antidegradation review is not required for discharges covered under Missouri's general storm water permits where the general permit templates were issued after the effective date of Missouri's antidegradation implementation procedure and where the templates incorporate necessary provisions to implement this procedure. Discharges approved under general permits that are not written to address antidegradation are subject to the procedures of this document prior to reissuance if the discharge is expected to cause **significant degradation** for any POCs. If significant degradation is not expected, the **administrative record of decisions** regarding the issuance of the permit shall include an explanation of how the significance of degradation was determined.

#### B. Site-Specific Permits

All site-specific permits, except for permits issued on non-discharging facilities, shall undergo an antidegradation review if a **significant degradation** is likely in the receiving water or downstream waters. Site-specific permit limits will be based upon applicable effluent guidelines, the characteristics of the discharge, cumulative affects, and an analysis designed to ensure that no significant degradation of the receiving water occurs. In addition, the permit limits must ensure that beneficial uses are maintained and protected in the receiving waters and downstream waters.

Applicants seeking site-specific permit coverage may be required to provide or collect existing water quality information on pollutants of concern reasonably expected to be in the discharge, if that information is not available. Data collection requirements may depend on the nature of the proposed discharge and the pollutants reasonably expected in the discharge.

### C. §401 Certifications

Section 404 of the Clean Water Act regulates the placement of dredged or fill material into the “waters of the United States,” including small streams and wetlands adjacent or connected to “waters of the United States.” The U.S. Army Corps of Engineers (COE) administers the §404 permit program dealing with these activities (e.g., wetland fills, in-stream sand/gravel work, etc.) in cooperation with the U.S. Environmental Protection Agency (EPA) and in consultation with other public agencies.

In order to ensure that antidegradation and other water quality protection requirements are considered, reviewed, and met in a comprehensive and efficient manner, these requirements will be addressed and implemented through the permitting and §401 water quality certification processes. Under this approach, applicants who fulfill the terms and conditions of applicable §404 permits and the terms and conditions of the §401 water quality certification related to the §404 permit will be considered to meet antidegradation requirements. Antidegradation considerations will be incorporated into §404 permits and the corresponding §401 certifications at the time of permit issuance.

For minor activities covered under §404 general permits (e.g., road culvert installation, utility line activities, bank stabilization, etc.), antidegradation requirements will be deemed to be met if all appropriate and reasonable BMPs related to erosion and sediment control, project stabilization, and prevention of water quality degradation (e.g., preserving vegetation, stream bank stability, and basic drainage hydrology) are applied and maintained. Applicants desiring to fulfill antidegradation review requirements under this approach will be responsible for ensuring that permit requirements and relevant water quality certification conditions are met.

Missouri manages its §401 water quality certification program to ensure that the placement of dredged or fill material into surface waters do not create any unmitigated water quality impairments or **significant degradation** of surface waters. Under the BMP-based approach adopted by Missouri, regulated activities for which mitigation has been certified by the state pursuant to §401 of the Clean Water Act will not be required to undergo a separate Tier 2 antidegradation review in accordance with this document.

The decision making process for §404 individual permits is contained in the §404(b)(1) guidelines (40 CFR Part 230) and contains all of the required elements for a Tier 1 and Tier 2 antidegradation review. Prior to issuing a permit under the §404(b)(1) guidelines, the COE must: 1) make a determination that the proposed discharges are unavoidable (i.e., necessary); 2) examine alternatives to the proposed activity and authorize only the least damaging practicable alternative; and 3) require mitigation for all impacts associated with the activity. A §404(b)(1) findings document is produced as

a result of this procedure and is the basis for the permit decision. Public participation is also provided for in this process. Because the §404(b)(1) guidelines meet the requirements of a Tier 1 and Tier 2 antidegradation review, the department will not conduct a separate review for the proposed activity. Tier 1 and Tier 2 antidegradation review will be met through §401 certification of individual §404 permits and will rely upon the information contained in the §404(b)(1) findings document.

#### IV. Monitoring and Assessment Considerations

##### A. Data Collection and Evaluation

Data gathered during the department's regular monitoring and assessment efforts shall be evaluated in accordance with the level of Tier review designated to the waters. Data gathered on a water being given a Tier 1 review shall be assessed for compliance with the narrative and numeric water quality standards of 10 CSR 20-7.031. Waters receiving Tier 3 review shall be assessed against the EWQ data or other appropriate reference stream data. Waters receiving Tier 2 review shall be assessed against EWQ data or other appropriate stream data unless degradation has been authorized since the EWQ data was collected. Assessments on waters that have undergone authorized degradation shall be assessed against the level of water quality that was predicted and documented in the **Administrative Record of Decisions** when the degradation was authorized. Such assessments shall be made on the same **pollutant-by-pollutant basis** as authorized by the antidegradation review.

##### B. Applicability to §305(b) Report and §303(d) List

Section 305(b) of the Clean Water Act requires each state to prepare and submit to EPA a biennial report describing water quality of all surface waters in the state. Each state must monitor water quality and review available data to determine if water quality standards are being met. From the §305(b) report, the §303(d) list is created which identifies surface waters that do not meet water quality standards. These waters are known as impaired waters. Identification of a surface water as impaired may be based on a violation of a numeric or narrative water quality standard.

To coordinate antidegradation reviews with the §305(b) and §303(d) listing process, the department will implement the following procedures:

**Tier 1 Protection (applicable to all waters):** No further degradation of existing water quality is permitted in a surface water where the existing water quality does not meet applicable water quality standards. Impaired waters are identified on Missouri's §303(d) List and targeted for future Total Maximum Daily Load (TMDL) development.

**Tier 2 Protection:** There will be no §303(d) listings based on Tier 2 antidegradation reviews. If a §305(b) water quality assessment shows that **significant degradation** of a surface water is occurring, but water quality standards have not been violated, the department may conduct a special study of the extent and source(s) of degradation to determine likely trends and explore possible antidegradation actions. Where possible, the department may develop an action plan for halting and reversing such degradation

by providing technical and other assistance to address probable sources of degradation and implement appropriate management practices, awarding priority points for grant or other funding programs targeted at water quality protection, amending permits or water quality certification conditions, and working with stakeholders to support actions needed to protect and restore water quality.

Tier 3 Protection: No long-term degradation is allowed in the unique waters afforded Tier 3 protection. If a §305(b) assessment shows that long-term degradation (i.e., not **temporary degradation**) of an **ONRW** or **OSRW** water is occurring, the department may conduct a special study of the extent and source(s) of degradation to determine likely trends and explore possible antidegradation actions.

Where possible, the department may develop an action plan for halting and reversing such degradation by providing technical and other assistance to probable sources of degradation to implement appropriate management practices, awarding priority points for grant or other funding programs targeted at water quality protection, amending permits or water quality certification conditions, and working with stakeholders to support actions needed to protect and restore water quality.

#### V. Applicability to Total Maximum Daily Loads

The department is required to develop waste load allocations (WLAs) for the restoration of impaired waters. When developing these WLAs, the department shall allocate pollution loads in accordance with the level of Tier protection designated to the waters. WLAs developed for Tier 1 protection shall be designed to achieve compliance with the narrative and numeric water quality standards of 10 CSR 20-7.031. WLAs on waters receiving Tier 3 protection shall be designed to meet the water's EWQ or other appropriate reference stream quality. WLAs on waters receiving Tier 2 protection shall be designed to meet the water's EWQ data or other appropriate stream quality unless degradation has been authorized since the EWQ data were collected. WLAs on waters that have undergone authorized degradation shall be developed for the level of water quality that was predicted and documented in the **Administrative Record of Decisions** when the degradation was authorized. Such WLAs shall be made on the same **pollutant-by-pollutant basis** as authorized by the antidegradation review.

#### VII. Administrative Record of Decisions

The department shall prepare a record of all information considered and decisions made during antidegradation reviews. The purpose this record is to create a historical reference to the basis for decisions and a complete explanation of the conclusions reached. The following list describes the documents necessary to complete the **Administrative Record of Decisions** on each antidegradation review.

- Final written decision on acceptability of degradation
- Existing Water Quality data or model on evaluated **segment** (or reference to the data) and the final Existing Water Quality of the **segment** determined following the last data or model interpretation
- Calculations for determining minimal degradation, if applicable

- Worksheet 1. General Worksheet for Antidegradation Review
- Worksheet 2. Worksheet for Evaluating Alternatives to Discharges
- Worksheet 3. Worksheet for Evaluating Implementation of State Level Controls on Point Sources and Effective Best Management Practices (BMPs) on Nonpoint Sources
- Worksheet 4. Worksheet for Using the Pollutant-by-Pollutant Approach for Determining Significance of Degradation
- Worksheet 5a. Worksheet for Documenting Socio-Economic Baseline Information and Treatment Costs
- Worksheet 5b. Worksheet for Documenting Socio-Economic Effects of Proposed Treatment
- Worksheet 5c. Test for Socio-Economic Importance and Impacts

## **APPENDIX 1**

### **Examples of Calculations for Minimal Degradation**

For the following six examples, the variables/terms are defined as follows:

CFS = Cubic feet per second

Cc = Chronic criterion (Note: Although these examples use the chronic criterion, in some cases the “acute” criterion may be more appropriate to use.)

Qs = stream flow (7Q10 or other representative flow)

Qd = average daily design flow of discharge in cubic feet per second (cfs)

Cs = pollutant concentration in stream

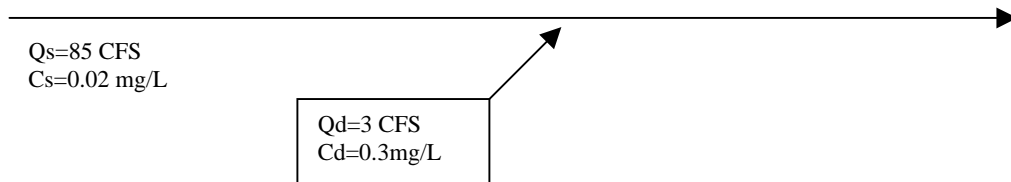
CF = Conversion Factor (to convert concentration to mass)

Cd = Discharge concentration



### Example 1 - Example calculation for determining minimal degradation from a new discharge

**Scenario:** A municipality plans to build a new WWTF with a design flow of 3 CFS (Qd) and an effluent zinc concentration of 0.3 mg/L. The receiving stream has a 7Q10 of 85 CFS and a existing concentration of 0.02 mg/L. The chronic criterion (Cc) of zinc is 0.151 mg/L.



$$\begin{aligned}\text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_d) - C_s \cdot Q_s] \cdot CF \\ &= [0.151 \text{ mg/L} \cdot (85 \text{ CFS} + 3 \text{ CFS}) - 0.02 \text{ mg/L} \cdot 85 \text{ CFS}] \cdot 5.4 \\ &= 62.58 \text{ lbs/day}\end{aligned}$$

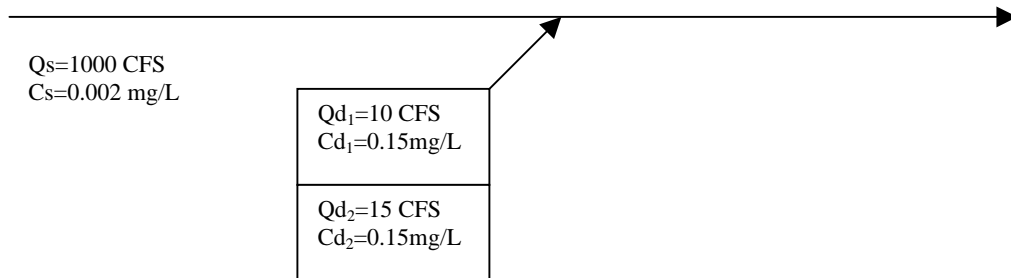
$$\begin{aligned}\text{New discharge load} &= Q_d \cdot C_d \cdot CF \\ &= 3 \text{ CFS} \cdot 0.3 \text{ mg/L} \cdot 5.4 \\ &= 4.86 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{Percent of WLA} &= (\text{New load} / \text{WLA}) \cdot 100 \\ &= (4.86 / 62.58) \cdot 100 \\ &= 7.77\%\end{aligned}$$

The discharge could be allowed without an antidegradation review since the net increase is less than the 10% minimal degradation threshold. A higher total discharge could be allowed if an antidegradation review indicates the activity may proceed.

## Example 2 - Example calculation for determining minimal degradation from an expanding discharge

**Scenario:** A municipality plans to expand its current WWTF from 10 CFS to 15 CFS and maintain its effluent copper concentration of 0.15 mg/L. The receiving stream has a 7Q10 of 1000 CFS and a existing concentration of 0.002 mg/L. The chronic criterion (Cc) of copper is 0.010 mg/L.



$$\begin{aligned}
 \text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{d2}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.01 \text{ mg/L} \cdot (1000 \text{ CFS} + 15 \text{ CFS}) - 0.002 \text{ mg/L} \cdot 1000 \text{ CFS}] \cdot 5.4 \\
 &= 44.0 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Current Load} &= Q_{d1} \cdot C_{d1} \cdot CF \\
 &= 10 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4 \\
 &= 8.1 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{New discharge load} &= Q_{d2} \cdot C_{d2} \cdot CF \\
 &= 15 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4 \\
 &= 12.2 \text{ lbs/day}
 \end{aligned}$$

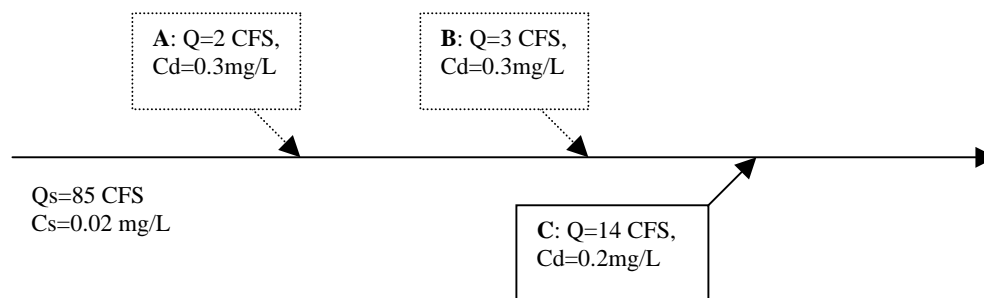
$$\begin{aligned}
 \text{Net increase} &= \text{New discharge} - \text{Current load} \\
 &= 12.2 \text{ lbs/day} - 8.1 \text{ lbs/day} \\
 &= 4.1 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Percent of WLA} &= (\text{Net increase} / \text{WLA}) \cdot 100 \\
 &= (4.1 / 44.0) \cdot 100 \\
 &= 9.32\%
 \end{aligned}$$

The discharge could be allowed without an antidegradation review since the net percent consumption of the WLA is less than the 10% minimal degradation threshold. A higher total discharge could be allowed if an antidegradation review indicates the activity may proceed.

### Example 3 - Example calculation for determining minimal degradation from a new discharge replacing an existing discharge

**Scenario:** A municipality plans to build a new WWTF (Plant C) with a design flow of 14 CFS ( $Q_d$ ) and an effluent zinc concentration of 0.2 mg/L. The new WWTF is to replace two current facilities (Plants A and B). Plant A has a design flow of 2 CFS and an effluent zinc concentration of 0.3 mg/L. Plant B has a design flow of 3 CFS and an effluent zinc concentration of 0.3 mg/L. The receiving stream has a flow of 85 CFS and an existing concentration of 0.02 mg/L. The chronic criterion ( $C_c$ ) of zinc is 0.151 mg/L.



$$\begin{aligned}
 \text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{dC}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.151 \text{ mg/L} \cdot (85 \text{ CFS} + 14 \text{ CFS}) - 0.02 \text{ mg/L} \cdot 85 \text{ CFS}] \cdot 5.4 \\
 &= 71.54 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Current Load} &= (Q_{dA} \cdot C_{dA} + Q_{dB} \cdot C_{dB}) \cdot CF \\
 &= (2 \cdot 0.3 + 3 \cdot 0.3) \cdot 5.4 \\
 &= 8.1 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{New discharge load} &= Q_{dC} \cdot C_{dC} \cdot CF \\
 &= 14 \text{ CFS} \cdot 0.2 \text{ mg/L} \cdot 5.4 \\
 &= 15.1 \text{ lbs/day}
 \end{aligned}$$

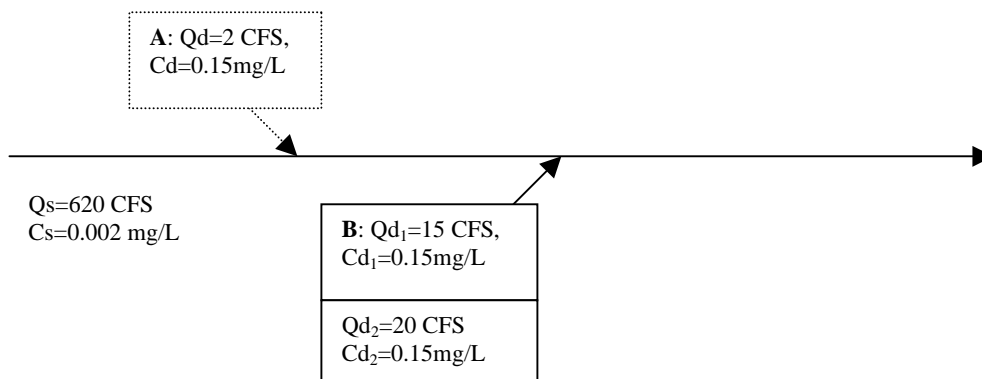
$$\begin{aligned}
 \text{Net increase} &= \text{New discharge} - \text{Current load} \\
 &= 15.1 \text{ lbs/day} - 8.1 \text{ lbs/day} \\
 &= 7.0 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Percent of WLA} &= (\text{Net increase} / \text{WLA}) \cdot 100 \\
 &= (7.0 / 71.54) \cdot 100 \\
 &= 9.78\%
 \end{aligned}$$

The discharge could be allowed without an antidegradation review since the net increase is less than the 10% minimal degradation threshold. A higher total discharge could be allowed if an antidegradation review indicates the activity may proceed.

#### Example 4 - Example calculation for determining minimal degradation from a new discharge replacing two existing discharges

**Scenario:** A municipality plans to expand its current WWTF (Plant B) from 15 CFS to 20 CFS while maintaining its effluent copper concentration at 0.15 mg/L. The expansion will replace Plant A. Plant A has a design flow of 2 CFS and an effluent copper concentration of 0.15 mg/L. The receiving stream has a 7Q10 of 620 CFS and a existing concentration of 0.002 mg/L. The chronic criterion (Cc) of copper is 0.010 mg/L.



$$\begin{aligned}
 \text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{d2}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.010 \text{ mg/L} \cdot (620 \text{ CFS} + 20 \text{ CFS}) - 0.002 \text{ mg/L} \cdot 620 \text{ CFS}] \cdot 5.4 \\
 &= 27.86 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Current Load} &= (Q_{dA} \cdot C_{dA} + Q_{dB1} \cdot C_{dB1}) \cdot CF \\
 &= (2 \cdot 0.15 + 15 \cdot 0.15) \cdot 5.4 \\
 &= 13.77 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{New discharge load} &= Q_{dB2} \cdot C_{dB2} \cdot CF \\
 &= 20 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4 \\
 &= 16.2 \text{ lbs/day}
 \end{aligned}$$

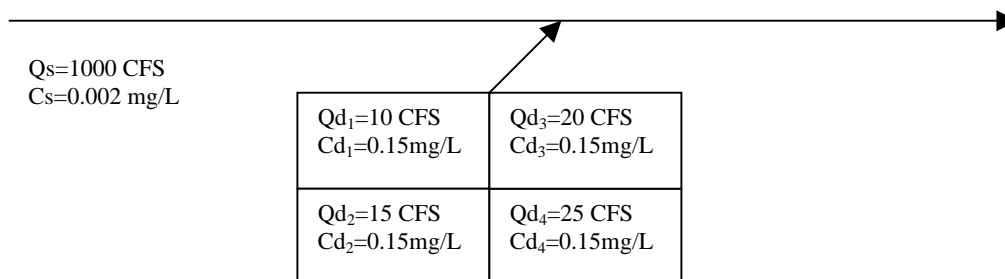
$$\begin{aligned}
 \text{Net increase} &= \text{New discharge} - \text{Current load} \\
 &= 16.2 \text{ lbs/day} - 13.77 \text{ lbs/day} \\
 &= 2.43 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Percent of WLA} &= (\text{Net increase} / \text{WLA}) \cdot 100 \\
 &= (2.43 / 27.86) \cdot 100 \\
 &= 8.72\%
 \end{aligned}$$

The discharge could be allowed without an antidegradation review since the net increase is less than the 10% minimal degradation threshold. A higher total discharge could be allowed if an antidegradation review indicates the activity may proceed.

### Example 5 - Example calculation for determining minimal degradation from an expanding discharge replacing an existing discharge (Page 1 of 2)

**Scenario:** Over a period of many years a municipality plans three separate expansions of its WWTF. Each expansion increases the design flow by an additional 5 CFS while maintaining its effluent copper concentration at 0.15 mg/L. The original design flow of the plant is 10 CFS. The receiving stream has a 7Q10 of 1000 CFS and a existing concentration of 0.002 mg/L. The chronic criterion (Cc) of copper is 0.010 mg/L.



#### First Expansion:

**Wasteload allocation** 
$$= [C_c \cdot (Q_s + Q_{d2}) - C_s \cdot Q_s] \cdot CF$$
  

$$= [0.01 \text{ mg/L} \cdot (1000 \text{ CFS} + 15 \text{ CFS}) - 0.002 \text{ mg/L} \cdot 1000 \text{ CFS}] \cdot 5.4$$
  

$$= 44.0 \text{ lbs/day}$$

**Current Load** 
$$= Q_{d1} \cdot C_d \cdot CF$$
  

$$= 10 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4$$
  

$$= 8.1 \text{ lbs/day}$$

**New discharge load** 
$$= Q_{d2} \cdot C_d \cdot CF$$
  

$$= 15 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4$$
  

$$= 12.15 \text{ lbs/day}$$

**Net increase** 
$$= \text{New discharge} - \text{Current load}$$
  

$$= 12.15 \text{ lbs/day} - 8.1 \text{ lbs/day}$$
  

$$= 4.05 \text{ lbs/day}$$

**Percent of WLA** 
$$= (\text{Net increase} / \text{WLA}) \cdot 100$$
  

$$= (4.05 / 44.0) \cdot 100$$
  

$$= 9.20\%$$

The first expansion could be allowed without an antidegradation review since the net percent consumption of the WLA is less than the 10% minimal degradation threshold.

#### Second Expansion:

**Wasteload allocation** 
$$= [C_c \cdot (Q_s + Q_{d3}) - C_s \cdot Q_s] \cdot CF$$
  

$$= [0.01 \text{ mg/L} \cdot (1000 \text{ CFS} + 20 \text{ CFS}) - 0.002 \text{ mg/L} \cdot 1000 \text{ CFS}] \cdot 5.4$$
  

$$= 44.28 \text{ lbs/day}$$

**Current Load** 
$$= Q_{d2} \cdot C_d \cdot CF$$
  

$$= 15 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4$$
  

$$= 12.15 \text{ lbs/day}$$

**New discharge load** 
$$= Q_{d3} \cdot C_d \cdot CF$$
  

$$= 20 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4$$
  

$$= 16.2 \text{ lbs/day}$$

**Net increase** 
$$= \text{New discharge} - \text{Current load}$$
  

$$= 16.2 \text{ lbs/day} - 12.15 \text{ lbs/day}$$
  

$$= 4.05 \text{ lbs/day}$$

**Percent of WLA** 
$$= (\text{Net increase} / \text{WLA}) \cdot 100$$
  

$$= (4.05 / 44.28) \cdot 100$$
  

$$= 9.15\%$$

**Example 5 - Example calculation for determining minimal degradation from an expanding discharge replacing an existing discharge (Page 2 of 2)**

$$\begin{aligned}\text{Cumulative net increase in load} &= 1^{\text{st}} \text{ Net increase} + 2^{\text{nd}} \text{ Net increase} \\ &= 4.05 \text{ lbs/day} + 4.05 \text{ lbs/day} \\ &= 8.1 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{Cumulative Percent of WLA} &= (\text{Cumulative net increase}/\text{WLA}) \cdot 100 \\ &= (8.1/44.28) \cdot 100 \\ &= 18.29\%\end{aligned}$$

The second expansion could be allowed without an antidegradation review since the net percent consumption of the WLA is less than the 10% minimal degradation threshold AND the cumulative percent consumption of the WLA is less than the 20% **cumulative degradation** threshold.

**Third Expansion:**

$$\begin{aligned}\text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{d_4}) - C_s \cdot Q_s] \cdot CF \\ &= [0.01 \text{ mg/L} \cdot (1000 \text{ CFS} + 25 \text{ CFS}) - 0.002 \text{ mg/L} \cdot 1000 \text{ CFS}] \cdot 5.4 \\ &= 44.55 \text{ lbs/day}\end{aligned}$$

$$\begin{array}{ll}\text{Current Load} &= Q_{d_3} \cdot C_d \cdot CF \\ &= 20 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4 \\ &= 16.2 \text{ lbs/day} \\ \text{New discharge load} &= Q_{d_4} \cdot C_d \cdot CF \\ &= 25 \text{ CFS} \cdot 0.15 \text{ mg/L} \cdot 5.4 \\ &= 20.25 \text{ lbs/day}\end{array}$$

$$\begin{array}{ll}\text{Net increase} &= \text{New discharge} - \text{Current load} \\ &= 16.2 \text{ lbs/day} - 12.2 \text{ lbs/day} \\ &= 4.05 \text{ lbs/day} \\ \text{Percent of WLA} &= (\text{Net increase}/\text{WLA}) \cdot 100 \\ &= (4.05/44.55) \cdot 100 \\ &= 9.09\%\end{array}$$

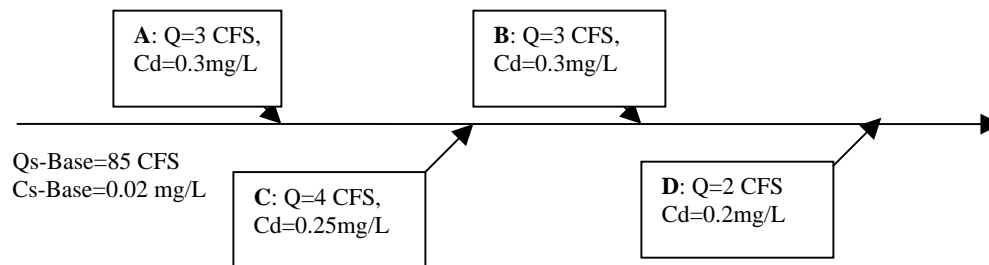
$$\begin{aligned}\text{Cumulative net increase in load} &= 1^{\text{st}} \text{ Net increase} + 2^{\text{nd}} \text{ Net increase} + 3^{\text{rd}} \text{ Net increase} \\ &= 4.05 \text{ lbs/day} + 4.05 \text{ lbs/day} + 4.05 \text{ lbs/day} \\ &= 12.15 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{Cumulative Percent of WLA} &= (\text{Cumulative net increase}/\text{WLA}) \cdot 100 \\ &= (12.15/44.55) \cdot 100 \\ &= 27.27\%\end{aligned}$$

The third expansion requires an antidegradation review. Although the net percent consumption of the WLA is less than the 10% minimal degradation, the cumulative percent consumption of the WLA is greater than the 20% **cumulative degradation** threshold. A higher total discharge could be allowed if an antidegradation review indicates the activity may proceed.

## Example 6 - Example calculation for determining minimal degradation from multiple new discharges (Page 1 of 3)

**Scenario:** Plant A currently discharges into a stream with a 7Q10 ( $Q_s$ -Base) of 85 CFS and a existing concentration ( $C_s$ -Base) of 0.02 mg/L. Plants B, C, and D are subsequently constructed on the same **segment** of river as depicted in the figure below. All 4 plants discharge zinc at concentrations shown below. The chronic criterion ( $C_c$ ) of zinc is 0.151 mg/L.



### Plant B (1<sup>st</sup> Addition):

The stream concentration ( $C_s$ ) and flow ( $Q_s$ ) just upstream of Plant B needs to be solved for.

$$\begin{aligned}
 Q_s &= Q_{s\text{-BASE}} + Q_{dA} \\
 &= 85 + 3 \\
 &= 88 \text{ CFS} \\
 C_s &= (Q_{s\text{-BASE}} \cdot C_{s\text{-BASE}} + Q_{dA} \cdot C_{dA}) / Q_s \\
 &= (85 \cdot 0.02 + 3 \cdot 0.3) / 88 \\
 &= 0.03 \text{ mg/L}
 \end{aligned}$$

$$\begin{aligned}
 \text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{dB}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.151 \text{ mg/L} \cdot (88 \text{ CFS} + 3 \text{ CFS}) - 0.03 \text{ mg/L} \cdot 88 \text{ CFS}] \cdot 5.4 \\
 &= 59.95 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{New discharge load} &= Q_{dB} \cdot C_{dB} \cdot CF \\
 &= 3 \text{ CFS} \cdot 0.3 \text{ mg/L} \cdot 5.4 \\
 &= 4.86 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Percent of WLA} &= (\text{Net increase} / \text{WLA}) \cdot 100 \\
 &= (4.86 / 59.95) \cdot 100 \\
 &= 8.11\%
 \end{aligned}$$

Plant B discharge could be allowed without an antidegradation review since the percent consumption of the WLA is less than the 10% minimal degradation threshold.

### Plant C (2<sup>nd</sup> Addition):

The stream concentration ( $C_s$ ) and flow ( $Q_s$ ) just upstream of Plant C needs to be solved for.

$$\begin{aligned}
 Q_s &= Q_{s\text{-BASE}} + Q_{dA} \\
 &= 85 + 3 \\
 &= 88 \text{ CFS} \\
 C_s &= (Q_{s\text{-BASE}} \cdot C_{s\text{-BASE}} + Q_{dA} \cdot C_{dA}) / Q_s \\
 &= (85 \cdot 0.02 + 3 \cdot 0.3) / 88 \\
 &= 0.03 \text{ mg/L}
 \end{aligned}$$

## Example 6 - Example calculation for determining minimal degradation from multiple new discharges (Page 2 of 3)

$$\begin{aligned}
 \text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{d_c}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.151 \text{ mg/L} \cdot (88 \text{ CFS} + 4 \text{ CFS}) - 0.03 \text{ mg/L} \cdot 88 \text{ CFS}] \cdot 5.4 \\
 &= 60.76 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{New discharge load} &= Q_{d_c} \cdot C_{d_c} \cdot CF \\
 &= 4 \text{ CFS} \cdot 0.25 \text{ mg/L} \cdot 5.4 \\
 &= 5.40 \text{ lbs/day} \\
 \text{Percent of WLA} &= (\text{Net increase/WLA}) \cdot 100 \\
 &= (5.40/60.76) \cdot 100 \\
 &= 8.89\%
 \end{aligned}$$

Since Plant C will consume less than 10% of the WLA, an antidegradation review may not be needed. However, the cumulative net increase needs to be compared to the cumulative 20% threshold before a final determination may be made regarding the necessity of an antidegradation review.

$$\begin{aligned}
 \text{Cumulative net increase in load} &= 1^{\text{st}} \text{ Net increase} + 2^{\text{nd}} \text{ Net increase} \\
 &= 4.86 \text{ lbs/day} + 5.40 \text{ lbs/day} \\
 &= 10.26 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Qs for entire segment} &= Q_{s\text{-BASE}} + Q_{d_A} + Q_{d_B} \\
 &= 85 + 3 + 3 \\
 &= 91 \text{ CFS}
 \end{aligned}$$

$$\begin{aligned}
 \text{Cs for entire segment} &= (Q_{s\text{-BASE}} \cdot C_{s\text{-BASE}} + Q_{d_A} \cdot C_{d_A} + Q_{d_B} \cdot C_{d_B}) / Q_s \\
 &= (85 \cdot 0.02 + 3 \cdot 0.3 + 3 \cdot 0.3) / 91 \\
 &= 0.038 \text{ mg/L}
 \end{aligned}$$

$$\begin{aligned}
 \text{WLA for entire segment} &= [C_c \cdot (Q_s + Q_{d_c}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.151 \text{ mg/L} \cdot (91 \text{ CFS} + 4 \text{ CFS}) - 0.038 \text{ mg/L} \cdot 91 \text{ CFS}] \cdot 5.4 \\
 &= 58.79 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{Cumulative Percent of WLA} &= (\text{Cumulative net increase/WLA}) \cdot 100 \\
 &= (10.26/58.79) \cdot 100 \\
 &= 17.45\%
 \end{aligned}$$

Plant C discharge could be allowed without an antidegradation review since the percent consumption of the WLA is less than the 10% minimal degradation threshold AND the cumulative percent consumption of the WLA is less than the 20% **cumulative degradation** threshold.

### Plant D (3<sup>rd</sup> Addition):

The stream concentration (Cs) and flow (Qs) just upstream of Plant D needs to be solved for.

$$\begin{aligned}
 Q_s &= Q_{s\text{-BASE}} + Q_{d_A} + Q_{d_B} + Q_{d_C} \\
 &= 85 + 3 + 3 + 4 \\
 &= 95 \text{ CFS}
 \end{aligned}$$

$$\begin{aligned}
 C_s &= (Q_{s\text{-BASE}} \cdot C_{s\text{-BASE}} + Q_{d_A} \cdot C_{d_A} + Q_{d_B} \cdot C_{d_B} + Q_{d_C} \cdot C_{d_C}) / Q_s \\
 &= (85 \cdot 0.02 + 3 \cdot 0.3 + 3 \cdot 0.3 + 4 \cdot 0.25) / 95 \\
 &= 0.047 \text{ mg/L}
 \end{aligned}$$

$$\begin{aligned}
 \text{Wasteload allocation} &= [C_c \cdot (Q_s + Q_{d_D}) - C_s \cdot Q_s] \cdot CF \\
 &= [0.151 \text{ mg/L} \cdot (95 \text{ CFS} + 2 \text{ CFS}) - 0.047 \text{ mg/L} \cdot 95 \text{ CFS}] \cdot 5.4 \\
 &= 54.98 \text{ lbs/day}
 \end{aligned}$$



### Example 6 - Example calculation for determining minimal degradation from multiple new discharges (Page 3 of 3)

<b>New discharge load</b>	$= Q_{dD} \cdot C_{dD} \cdot CF$	<b>Percent of WLA</b>	$= (\text{Net increase}/\text{WLA}) \cdot 100$
	$= 2 \text{ CFS} \cdot 0.2 \text{ mg/L} \cdot 5.4$		$= (2.16/54.98) \cdot 100$
	$= 2.16 \text{ lbs/day}$		$= 3.93\%$

Since Plant D will consume less than 10% of the WLA, an antidegradation review may not be needed. However, the cumulative net increase needs to be compared to the cumulative 20% threshold before a final determination may be made regarding the necessity of an antidegradation review.

**Cumulative net increase in load**

$$= 1^{\text{st}} \text{ Net increase} + 2^{\text{nd}} \text{ Net increase} + 3^{\text{rd}} \text{ Net increase}$$

$$= 4.86 \text{ lbs/day} + 5.40 \text{ lbs/day} + 2.16 \text{ lbs/day}$$

$$= 12.42 \text{ lbs/day}$$

**Qs for entire segment**

$$= Q_{S\text{-BASE}} + Q_{dA} + Q_{dB} + Q_{dC}$$

$$= 85 + 3 + 3 + 4$$

$$= 95 \text{ CFS}$$

**Cs for entire segment**

$$= (Q_{S\text{-BASE}} \cdot C_{S\text{-BASE}} + Q_{dA} \cdot C_{dA} + Q_{dB} \cdot C_{dB} + Q_{dC} \cdot C_{dC}) / Q_s$$

$$= (85 \cdot 0.02 + 3 \cdot 0.3 + 3 \cdot 0.3 + 4 \cdot 0.25) / 95$$

$$= 0.047 \text{ mg/L}$$

**Wasteload allocation**

$$= [C_c \cdot (Q_s + Q_{dD}) - C_s \cdot Q_s] \cdot CF$$

$$= [0.151 \text{ mg/L} \cdot (95 \text{ CFS} + 2 \text{ CFS}) - 0.047 \text{ mg/L} \cdot 95 \text{ CFS}] \cdot 5.4$$

$$= 54.98 \text{ lbs/day}$$

**Cumulative Percent of WLA**

$$= (\text{Cumulative net increase}/\text{WLA}) \cdot 100$$

$$= (12.42/54.98) \cdot 100$$

$$= 22.59\%$$

Plant D discharge requires an antidegradation review. Although the percent consumption of the WLA is less than the 10% minimal degradation threshold, the cumulative percent consumption of the WLA is greater than the 20% **cumulative degradation** threshold. A higher total discharge could be allowed if an antidegradation review indicates the activity may proceed.

## APPENDIX 2

### Example Modeling Approach For Determining Existing Water Quality

The following presents a method for determining whether or not a pollutant parameter or **pollutant of concern** (POC) is significantly less than the water quality standard (i.e., that a significant available assimilative capacity exists for the POC). These determinations are typically made from small data sets, so the method below is tailored to that situation.

1. It may be assumed that data on most trace pollutants, such as ammonia, metals, pesticides and nutrients are not normally distributed and therefore will require log transformation as the first step in the process. If the parameter is dissolved oxygen, pH, water temperature, or any of the major ions such as sulfate or chloride, a normal distribution may be assumed and a log transformation of the data would not be necessary.
2. Log transform the data (i.e., substitute the natural log of the datum for its true value).
3. Calculate the sample mean and the 90 percent confidence interval around the mean. This may be done with EXCEL software (Tools/Data Analysis/Descriptive Statistics).
4. Calculate the antilog of the upper and lower confidence limits. If this range falls below the water quality standard, the data is shown to be significantly lower than the standard with the chosen level of confidence. If the standard falls within or below the confidence interval, the data would not be considered significantly lower than the standard, and consequently, one must assume that no available assimilative capacity exists.

Example:

POC = Dissolved Aluminum ( $\mu\text{g/L}$ )

Sample Results = 20, 40, 30, 850

WQ Standard = 750

Log Transformed Data = 3, 3.69, 3.4, 6.75

Log Mean = 4.21    Log 90% Confidence Limit = 2.02

Log of 90% Confidence Interval =  $(4.21 - 2.02)$  to  $(4.21 + 2.02)$  = 2.19  $\mu\text{g/L}$  to 6.23  $\mu\text{g/L}$

90% Confidence Interval = 8.9  $\mu\text{g/L}$  to 507.75  $\mu\text{g/L}$

Since this interval is less than the 750  $\mu\text{g/L}$  standard, data set is judged to be significantly less than the standard. Therefore, a significant available assimilative capacity exists for aluminum. As a result, a Tier 2 antidegradation review is required for any additional discharge of aluminum resulting in more than minimal degradation.

## **APPENDIX 3**

### **Worksheets**

## **Worksheet 1.**

### **General Worksheet for Antidegradation Reviews** (Page 1 of 4)

*(To be completed by the Missouri Department of Natural Resources)*

1. Name of Reviewer: \_\_\_\_\_  
Date: \_\_\_\_\_  
Name of Receiving Water(s): \_\_\_\_\_  
Basin(s): \_\_\_\_\_  
**Identify Segment\* (where it begins and ends):**  
Upstream: \_\_\_\_\_  
Downstream: \_\_\_\_\_  
Stream Classification(s): \_\_\_\_\_
2. Brief Description of Proposed Activity (e.g., domestic discharge, industrial process water, storm water discharge): \_\_\_\_\_
3. Which Tier(s) of antidegradation review applies(y) to the discharged pollutants?  
Tier 3 - go to question 4.  
  
Tier 2 - go to question 7.  
  
Tier 1 - go to question 13.

**Tier 3 Questions - WBID No.(s)** \_\_\_\_\_ (Include all involved segments.)

4. Will the proposed activity result in a permanent new or expanded source of pollutants directly to an Outstanding National Resource Water (ONRW) or Outstanding State Resource Water (OSRW) segment?  
  
☐ YES - recommend denial of proposed activity.  
  
☐ NO
5. If the proposed activity will result in a permanent new or expanded source of pollutants to a segment upstream from an ONRW or OSRW segment, will the proposed activity affect ONRW or OSRW water quality?  
  
☐ YES - recommend denial or proposed activity.  
  
☐ NO

Basis for conclusion:

**Worksheet 1. General Worksheet for Antidegradation Reviews** (Page 2 of 4)

6. If the proposed activity will result in a non-permanent new or expanded source of pollutant(s) to an ONRW or OSRW segment or a segment upstream from an ONRW or OSRW segment, will the proposed activity only result in **temporary degradation** of ONRW or OSRW water quality?

- ☐ YES
- ☐ NO - recommend denial of proposed activity

Basis for conclusion:

**Tier 2 Questions - WBID No.(s)** \_\_\_\_\_ (Include all involved segments.)

7. Does the water body qualify for Tier 2 review as a result of a identified **available assimilative capacity** for at least one **pollutant of concern**?

- ☐ YES
- ☐ NO

If no, basis for conclusion that Tier 2 does not apply:

8. Does Worksheet 4 show that the proposed activity will only result in **minimal degradation**?

- ☐ YES - antidegradation review is satisfied. If yes, explain conclusion.

- ☐ NO - further antidegradation review required

**Worksheet 1. General Worksheet for Antidegradation Reviews** (Page 3 of 4)

9. Has Worksheet 2 been properly completed and does it demonstrate that there are no reasonable alternatives to degradation? (See section II.B of this document)

☐ YES

☐ NO - recommend denial of the proposed activity

If no, basis for conclusion:

10. Does Worksheet 5 demonstrate that the proposed activity will provide important socio-economic development (or avoid substantial socio-economic impacts) in the area in which the affected waters are located? (See section II.E of this document)

☐ YES

☐ NO - recommend denial of the proposed activity

If no, basis for conclusion:

11. Does Worksheet 4 show the predicted level of **pollutants of concern** (POC) within the water following the proposed discharge and are these levels within the **Water Quality Standards** (WQS)?

☐ YES

☐ NO - recommend denial of the proposed activity

12. Does Worksheet 3 show that state-required controls on point sources and voluntary controls of nonpoint sources are implemented within the watershed? (See sections II.C and II.D of this document)

☐ YES

☐ NO - recommend denial of the proposed activity

Basis for conclusion:

**Tier 1 Questions - WBID No.(s) \_\_\_\_\_ (if more than one segment or tier is reviewed)**

- ☐
- YES

- If no, basis for conclusion:

☐ YES – If yes, dates: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ - \_\_\_\_ / \_\_\_\_ / \_\_\_\_  
m m d d y y y y m m d d y y y y

- ☐ NO

- ☐
- YES

- ☐
- NO

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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## ***Worksheet 2.***

### **Worksheet for Evaluating Alternatives to Discharges** (Page 1 of 6)

*(To be completed by the Applicant)*

This worksheet is comprised of three parts:

- Part 1 - Identifying Less-Degrading and Non-Degrading Pollution Control Measures
- Part 2 - Evaluating Environmental Impacts Associated with Alternatives
- Part 3 - Comparing Costs of Various Alternatives
- Part 4 - Deciding on Reasonableness of Implementation

*Each part should be answered fully to complete the **Administrative Record of Decisions**.*

#### **Part 1 - Identifying Less-degrading and Non-Degrading Pollution Control Measures**

Applicants proposing new or expanded discharges will be expected to address reasonable and cost-effective alternatives, or a mix of alternatives in their evaluations, including approaches that are completely different from conventional practice, e.g., land application (subsurface/surface), deep well injection, alternative discharge locations, and other alternatives. The department staff and the applicant should meet to discuss these and other issues early in the process. It is the responsibility of the applicant to screen for and propose a list of available, cost-effective alternatives that will be evaluated in detail. The department may require an analysis for alternatives in addition to the ones listed below. At a minimum, the review must confirm that each of these listed alternatives has been considered.

In the space below each alternative, please explain the reason for not implementing the alternative, or explain the extent to which the alternative is implemented (attach additional sheets if needed).

#### **Non-Discharging Alternatives:**

- ☐ Pollution prevention and treatment process changes
  
- ☐ Recycling OR reusing wastewater (i.e., closed loop systems)
  
- ☐ Holding OR transport facilities for treatment OR discharge elsewhere



**Worksheet 2. Worksheet for Evaluating Alternatives to Discharges (Page 2 of 6)**

Non-Discharging Alternatives (continued):

- ☐ Groundwater recharge (i.e., soil-aquifer treatment)
  
- ☐ 100 percent reuse
  
- ☐ Other

Non-Degrading or Less-Degrading Alternatives:

- ☐ Advanced or innovative biological/physical/chemical treatment
  
- ☐ Pollution prevention and process changes
  
- ☐ Improvements in the collection system
  
- ☐ Improved operation and maintenance of existing treatment system

**Worksheet 2. Worksheet for Evaluating Alternatives to Discharges (Page 3 of 6)**

Non-Degrading or Less-Degrading Alternatives (continued):

- ☐ Seasonal or controlled discharges to avoid critical periods
  
- ☐ Alternative discharge locations
  
- ☐ Reduction in the scope of the proposed project
  
- ☐ Other

**Part 2 - Evaluating Environmental Impacts Associated with Alternatives**

Pollution control measures that are evaluated as alternatives to a proposed discharge may have their own environmental impacts that help define their overall value and/or desirability.

Applicants are required to provide information on any impacts on water quality or **beneficial uses** resulting from implementation of the alternative. The types of impacts evaluated during this process include, but are not limited to, the ones listed below.

In the space below each activity or condition, the reviewer should list each proposed alternative and provide an evaluation of environmental impacts for each.

For all activities or conditions that influence the quality of the discharge:

- ☐ Sensitivity of stream uses

**Worksheet 2. Worksheet for Evaluating Alternatives to Discharges (Page 4 of 6)**

For all activities: (continued)

- ☐ Need for low-flow augmentation
  
  
  
  
  
  
  
  
  
  
- ☐ Sensitivity of groundwater uses in the area
  
  
  
  
  
  
  
  
  
  
- ☐ Potential to generate secondary water quality impacts (e.g., storm water, hydrology)
  
  
  
  
  
  
  
  
  
  
- ☐ System or technology reliability, potential for upsets or accidents
  
  
  
  
  
  
  
  
  
  
- ☐ Effect on endangered species

For all discharges:

- ☐ Nature of pollutants discharged

## Worksheet 2. Worksheet for Evaluating Alternatives to Discharges (Page 5 of 6)

For all discharges (continued):

- ☐ Dilution ratio for pollutants discharged
  
  
  
  
  
  
  
  
  
  
- ☐ Discharge timing and duration

### Part 3 - Comparing Costs of Various Alternatives

In the boxes below, please describe the alternatives considered in accordance with section II.B.4 (and Figure 5) of the *Missouri Antidegradation Policy and Implementation Procedure*.

The cost of treatment that results in no discharges of any <b>pollutants of concern</b> (the “no-discharge” cost) (See “A = The ‘no degradation’ alternative” in Figure 5):
\$
The cost of treatment that produces an effluent that results in no or <b>minimal degradation</b> of the receiving water, i.e., that does not consume more than 10 percent of the available assimilative capacity for any pollutant of concern (POC) (See “B = the ‘no significant degradation’ alternative” in Figure 5):
\$
The cost of treating an effluent to a quality that meets specific effluent/best available technology (BAT) limits or water quality criteria for any/all <b>pollutants of concern</b> (i.e., the minimum Tier 1 requirement) (See “C” = the <b>preferred alternative</b> (i.e., selected alternative) in Figure 5):
\$

**Worksheet 2. Worksheet for Evaluating Alternatives to Discharges** (Page 6 of 6)

## **Part 4 - Deciding on Reasonableness of Alternatives and Choosing a Preferred Alternative**

The applicant shall explain the conclusions of the alternative analysis below including an evaluation of the costs above for the proposed discharge, the less- and non-degrading alternatives, and the effectiveness, costs and feasibility associated with each mix of options.

Explanation of the reasons for choosing the preferred alternative and rejecting the evaluated alternatives:

**Worksheet for Evaluating Implementation of  
State Level Controls on Point Sources, and  
Effective Best Management Practices (BMPs) on Nonpoint Sources** (Page 1 of 2)

### Point Sources:

2. Do each have effective permits?

☐ NO

3. Is each point source in compliance with their permits or subject to other enforceable provisions to ensure compliance with the water quality standards?

**Worksheet 3. Worksheet for Evaluating Implementation of State Level Controls on Point Sources, and Effective Best Management Practices (BMPs) on Nonpoint Sources (Page 2 of 2)**

Nonpoint Source BMPs:

1. Does the watershed to the evaluated water include activities that would benefit from BMPs?

☐ YES

☐ NO

If no, the following review for nonpoint source BMPs is not necessary.

2. Are nonpoint source BMPs in place within the watershed of the evaluated water?

☐ YES

☐ NO

If yes, describe the practices:

If no, what action is the department taking to ensure proper BMP implementation within the watershed?

## ***Worksheet 4.***

### **Worksheet for Using the Pollutant-by-Pollutant Approach for Determining Significance of Degradation (Page 1 of 1)**

*(To be completed by the Applicant)*

1. What is [are] the Pollutant[s] of Concern (POC)?

2. Where:

WLA = Waste Load Allocation (i.e., the total pollutant load allowable in new discharge)

WQC = Water Quality Criteria (represented as a concentration, e.g., mg/L)

Qs = stream flow (7Q10 or other representative flow)

Qd = average daily design flow of discharge in cubic feet per second (cfs)

Cs = pollutant concentration in stream

Qs = stream flow

CF = Conversion Factor (to convert concentration to mass)

Using the following equation, determine WLA for each POC:

$$WLA = [WQC*(Qs+Qd)-Cs*Qs]*CF$$

3. Convert new discharge load into mass:

$$Qd*Cd*CF$$

4. Calculate percent of WLA:

$$(New\ load/WLA)*100$$

If the percent WLA is less than 10 percent, minimal degradation would occur.



**Worksheet 5a.**  
**Worksheet for Documenting**  
**Socio-Economic Baseline Information and Treatment Costs** (Page 1 of 2)

*(To be completed by all Applicant)*

**1. The Community Socio-Economic Baseline Information:**

Define the Affected Community (i.e., the governmental jurisdiction):

Current Population (number of households) of the Affected Community:

Current Median Household Income of the Affected Community:

Unemployment Rate of the Affected Community:

Annual Tax Revenue of the Affected Community (for the last year):

Assessed Property Value of the Community:

Housing Demand of the Affected Community:

**Worksheet 5a. Worksheet for Documenting Socio-Economic Baseline Information and Treatment Costs (Page 2 of 2)**

**2. Costs Associated with the Proposed Wastewater Treatment or Control Technology:**

Estimated Total Capital Costs of the Proposed Treatment:

--

Estimated Annual Capital Costs of the Proposed Treatment:

--

Estimated Annual Operating and Maintenance Costs:

--

Type of Financing (e.g., bonds, revenue bond, bank loan, State Revolving Fund, grant, etc.):

--

Interest of Financing:

--

Time Period of Financing:

--

***Worksheet 5b.***

**Worksheet for Documenting  
Socio-Economic Effects of the Proposed Treatment (Page 1 of 2)**

*(To be completed by all Applicant)*

***Does the Proposed Treatment Plan...***

**1. Create or expand employment?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

**2. Reduce the unemployment rate?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

**3. Increase median family income?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

**Worksheet 5b. Worksheet for Documenting Socio-Economic Effects of the Proposed Treatment (Page 2 of 2)**

**4. Reduce the number of households below the poverty line?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

**5. Increase the community tax base?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

**6. Increase needed housing supply?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

**6. Provide necessary public services (e.g., school, infrastructure, fire department, etc.)?**

☐ Yes ☐ No Explain:\_\_\_\_\_

\_\_\_\_\_

☐ Don't Know

☐ Not Applicable

## Worksheet 5c.

### Test for Socio-Economic Importance and Impacts (Page 1 of 4)

*(Section (A) to be completed when used by **public** entities.  
Section (B) to be completed when used by **private** entities.)*

#### A. Public Entities (or other non-profit entities):

##### Preliminary Test for Public Entities

The Municipal Preliminary Screener (MPS) indicates the level of economic impacts that would result from providing treatment necessary to prevent degradation. Where the MPS shows “little impact,” the request to allow for degradation may be rejected because of significant widespread socio-economic impact from applying the technology that will prevent degradation.

$$\text{MPS} = (\text{Total Annual Pollution Control Cost per Household} / \text{Median Household Income}) \times 100$$

<b>Municipal Preliminary Screener (MPS)</b>	<b>Results</b>	<b>Action</b>
1. If the MPS is less than 1.0%	Little Impact	Reject the Request
2. If the MPS is in the range of 1.0 to 2.0%	Mid-Range Impact	Proceed to Secondary Test
3. If the MPS is greater than 2.0%	Large Impact	Proceed to Secondary Test

If the total annual cost per household (existing annual cost per household plus the incremental cost related to the full treatment option) is less than 1.0 percent of median household income, it is assumed that the treatment necessary to prevent degradation is not expected to impose economic hardship on households. Communities with MPS results of equal to or more than 1.0 percent may proceed to the secondary tests.

##### Secondary Test for Public Entities

The secondary test is designed to build upon the characterization of the financial burden identified in the preliminary test. The secondary test indicates the community’s ability to obtain financing and describes the socio-economic health of the community. Indicators describe precompliance debt, and socio-economic and financial management conditions in the community. Using these indicators and the scoring system described below, an impact estimate can be calculated on the treatment necessary to prevent degradation.

**Worksheet 5c. Test for Socio-Economic Importance and Impacts** (Page 2 of 4)

	<b>Secondary Indicator Scores</b>		
<b>Indicators</b>	<i>Weak</i> (Score of 1 point)	<i>Mid-Range</i> (Score of 2 points)	<i>Strong</i> (Score of 3 points)
1. Bond Rating Indicator	Below (any Bond rating)	Equal to (any Bond rating)	Above (any Bond rating)
2. Overall Net Debt as a % of Full Market Value of Taxable Property Indicator	Above 5%	2 - 5%	Below 2%
3. Unemployment Rate Indicator	Above National Average	Equal to National Average	Below National Average
4. Median Household Income Indicator	Below State Median	Equal to State Median	Above State Median
5. Property Tax Revenues as a % of Full Market Value of Taxable Property	Above 4%	2 - 4%	Below 2%
6. Property Tax Collection Rate Indicator	< 94%	94 - 98%	> 98%

Summing the individual scores and dividing by the number of factors being used arrives at a cumulative assessment score. The cumulative assessment score is evaluated as follows:

- Less than 1.5 is considered weak.
- Between 1.5 and 2.5 is considered mid-range.
- Greater than 2.5 is considered strong.

**B. Private Entities:**

**Preliminary Test for Private Entities**

**Worksheet 5c. Test for Socio-Economic Importance and Impacts** (Page 4 of 4)

The current economic condition of the affected community and the role of the affected entities within the community should be considered when determining the appropriateness of water quality degradation. Through property taxes and employment, the entity(ies) may be a key contributor to the economic base of the affected community. The socio-economic importance (SEI) of proposed activity may outweigh the benefits of maintaining water quality. The following information shall be recorded to determine the benefits to the community (i.e., the SEI) from the proposed activity:

1. Tax revenues to be paid to the affected community by the private entity;
2. Tax revenues to be paid by the private entity as a percentage of the affected community's total tax revenues;
3. The increase in the property value in the affected community;
4. Additional number of jobs created by the proposed activity and/or decrease in unemployment rate of the affected community and surrounding area;
5. Any resulting increase in Median Household Income and/or personal income of the affected community;
6. Expenditures on social services saved as a result of implementing the proposed activity in the affected community.

### **Secondary Test for Private Entities**

The financial or "profit" test should be used to only to determine if a financial adverse impact will be imposed on the applicant if a less-degrading alternative was chosen from those identified as otherwise being effective and reasonable during the alternatives analysis. If the dischargers are not able to demonstrate adverse impacts from a less-degrading alternative, the proposed alternative may be denied. If the financial tests suggest that a private entity or group of entities will be significantly impacted by having to provide non-degrading or less-degrading alternatives, or if no other effective or reasonable alternatives were identified by the alternatives analysis, the SEI verified by the Primary Test will be sufficient to justify degradation.

Four general financial tests are designed to examine the financial impacts on the private entity due to costs associated with implementing pollution control measures. The financial tests are 1) Profit Test, 2) Liquidity, 3) Solvency and 4) Leverage.

- 1.) The Profit Test measures what will happen to the discharger's earnings by providing treatment necessary to prevent degradation. The profit test shows no impact if the profit rate increased or did not change. Two pieces of information are needed for the Profit Test. The first piece is the total annual cost of the required pollution control. The second piece is the earnings before taxes.

$$\text{The Profit Rate} = \text{Earnings Before Taxes} / \text{Revenues}$$

**Worksheet 5c. Test for Socio-Economic Importance and Impacts** (Page 3 of 4)

- 2.) Liquidity is a measure of how easily a discharger can pay its short-term bills. One measure of liquidity is the Current Ratio:

$$\text{Current Ratio} = \text{Current Assets} / \text{Current Liabilities}$$

The general rule is, if the Current Ratio is greater than two (2), the entity should be able to cover its short-term obligations.

- 3.) Solvency is a measure of an entity's ability to meet its fixed and long-term obligations. One measure of solvency is the Beaver's Ratio:

$$\text{Beaver's Ratio} = \text{Cash Flow} / \text{Total Debt}$$

If the Beaver's Ratio is greater than 0.2, the entity is considered solvent (i.e., can pay its long-term debts). If the Beaver's Ratio is less than 0.15, the discharger may be insolvent (i.e., bankrupt). If the Beaver's Ratio is between 0.15 and 0.20, the future is uncertain.

- 4.) Leverage tests measure the extent to which a firm already has fixed financial obligations and thus indicate how much money a firm is capable of borrowing. The Debt to Equity Ratio is the most commonly used method of measuring leverage:

$$\text{Debt / Equity Ratio} = \text{Long-Term Liabilities} / \text{Owners' Equity}$$

Since there are no generally accepted Debt/Equity Ratio values that apply to all types of economic activity, the ratio should be compared with the ratios of firms in similar businesses. If the entity's ratio compares favorably with the median or upper quartile ratio for similar business, it should be able to borrow additional funds.